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[OFFICIAL NOTICE.]

First Annual Meeting, Canadian Gas Association.

OFFICE OF SECRETARY-TREASURER,
CANADIAN GAS ASSOCIATION,
WOODSTOCK, ONT., May 11th, 1908.

To the Members of the Canadian Gas Association: Gentlemen—The first annual meeting of the Canadian Gas Association will be held in Toronto, Friday, June 19th, 1908. Papers are in the course of preparation and announcement of the titles will be made later. Arrangements are in the hands of an Entertainment Committee for the entertainment of delegates, outside of the business meetings. There will be trips of interest, including a visit to the large, modern plant of the Consumers Gas Company, and to various points in the city. The business meeting will be held in the King Edward Hotel. It is suggested that reservations be made at as early a date as possible. Please advise me if you expect to be present. Yours very truly,

A. W. MOORE, Secretary-Treasurer.

BRIEFLY TOLD.

THE FIRST MEETING OF THE SOUTHERN GAS ASSOCIATION.—"Dear JOURNAL: Those who were present in the Piedmont Hotel, Atlanta, Ga., the morning of the 18th inst.—and there were two score on hand and participating—are now fully satisfied that there was not only reason for a Southern Gas Association, but need as well. The first annual meeting further shows that Messrs. Congdon, Miller, Maxon and their associates in the tentative organizing of the body knew what good cause existed for the original steps taken towards the formation of the Association. Of course, the initial proceedings were not fraught heavily with technical matter, but it is a fact neverthless that at least two of the impromptu discussions will furnish interesting reading for your subscribers when the stenographer's notes have been fully threshed out. A bare summary of that which was done will do for a prelude to the complete report. Forty delegates, well known to the industry, were on hand (the States represented being Georgia, Mississippi, Alabama, Florida, North Carolina and Tennessee) to greet the call to order of the Chairman, Mr. R. C. Congdon, who was ably assisted from the Secretary's desk by Mr. J. H. Maxon. The objects of the Association having been fairly stated, it was resolved to have the membership come from the States named, with South Carolina, Virginia, West Virginia and Kentucky eligible to the territorial limits. The planks of the Constitution submitted—in the main these resemble very much the articles that governed the Western Gas Association, of beloved memory—were accepted with acclaim. In the permanent organization proceedings the officers elected were the following: President, Thos. D. Miller; Vice-President, R. C. Congdon; Secretary-Treasurer, James Ferrier—he surely is a noble Roman; Executive Committee, D. R. Swing, D. C. Williams, K. L. Simons, H. W. Frund, A. B. Patterson, H. W. Young and J. H. Maxon. The next meeting was set for a date in February, to be determined by the Executive Committee, the meeting place to be in the home city of the President-elect—New Orleans. The entertainment, too, was quite brisk. It included trolley rides through and around busy, beautiful Atlanta, the appearance of which bustling market was far from that that is associated with hard times—indeed, the feeling aroused was quite to the contrary—dining sessions *ad lib.*, and a jolly theater party at the Casino. The weather conditions were fairly good, the enthusiasm was unbounded, and it may be considered certain that the Southern Gas Association will be up with the leaders when fairly settled in its stride. We are all doffing our hats to Mr. Congdon (giving Mr. Miller, of course, a partnership salute) for the clever initial moves that resulted in this newest member in Gas Association work.—R."

THE MILWAUKEE MEETING OF THE WISCONSIN GAS ASSOCIATION.—The 1908 meeting of the Wisconsin Gas Association was brought off in the Hotel Pfister, Milwaukee, Wis., on the appointed days, with good weather, an excellent attendance, a fine technical programme and a social side that was most enjoyable. In the regretted absence of the President (Mr. Edward Daniell) the task of directing the proceedings devolved upon the Vice President, Mr. Sheldon J. Glass, who, it is needless to add, made an excellent director. A feature of the attendance (which was notably large and representative) was the pres ence of the Chairman of the Public Rate Commission, of Wisconsin, Mr. B. H. Meyer, whose commonsense placing before the Association, of the relations that should exist between the State and the Companies, was certainly of a nature well qualified to arouse the thought that there could be more harmful measures enacted in respect of the lighting industry of Wisconsin than those which resulted in the establishing of the Commission. The paper list was a fine one, in respect of quality and number, and its clearing up, without slighting any subject, was wonderfully well accomplished. One number which held the utmost attention of the members was that descriptive of "The Tendency of the Times, and Its Effect upon Rates." Mr. H. L. Doherty led off in this matter, and he certainly

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SMITHSONIAN DEPOSIT.

held the close attention of his hearers, even though a goodly number were not prepared to concur in his speculations as to the curtailment of the increased use of gas for illuminating purposes through the still more extensive adaptation of electrical currents in the lighting of the homes of the masses. Other interesting and well-thought out papers included the following: "The Valuation of Properties," by Mr. R. B. Brown, "The Necessity of Proper Maintenance of Meters," by Mr. E. S. Dickey; "Depreciation," by Mr. E. S. Mack; and "The Work of Gas Associations," by Mr. L. S. Bigelow. There can be no doubt that the technical matter presented was good and abundant. The election for officers resulted in the following namings: President, Mr. David Douglas - Mr. Glass positively refused to accept the position; Vice-President, Mr. W. Wallen; Secretary-Treasurer, Mr. H. H. Hyde. Mr. Glass, however, was prevailed upon to accept the office of representative of the Wisconsin Gas Association on the Directorate of the American Gas Institute. Milwaukee was chosen as the next meeting place, and a big increase on the rolls was made by the placing of new names thereon. Of course, there was a plenty of entertainment, but the particular number of that list was the banquet on the night of Thursday, which affair was nobly done within the hospitable tenement of the Milwaukee Athletic Club. The speeches that attracted most attention were those delivered by Mr. John I. Beggs and Commissioner Meyer. In fact, the remarks of the former were an excellent foil to the utterance of the latter. To sum it up it looks that there will be little friction between the Commissioners and the gas companies of the State. Viewed from all points the meeting must result in a great showing up of the fact that State Commissions are not altogether unreasonable tribunals; in fact, that they are very much the reverse.

A THOUGHT OR TWO OVER A REPORT.—The "Transactions" of the Illuminating Engineering Society for March, of course, contained much that is interesting and valuable; but the fact is also true that some of the statistics printed in connection with the Society *per se* are a trifle odd. The entrance fee of $5 has been waived until 1909, so that those desirous of joining will obtain all of the benefits for the regular dues of $5 per year. Its membership to March had reached a total of 982, and an analysis of the subdivision thereof reveals some curious things. As might be expected, New York leads in the number of members and approximately 30 per cent. of those in the United States reside in that State. In view of the fact that it has been stated that the Society has been greatly influenced by the electrical interests, it may be interesting to note that, in both New York city and Boston, there are nearly as many men associated with the local gas company as those connected with the electric light company, while in Philadelphia the electric light company members outnumber the gas company men three to one. In Chicago the Peoples Gas Light and Coke Company does not seem to be represented, although 87 members are returned as residents of the Western Metropolis. It is in the named cities that local Sections hold meetings, so it would seem that, even if it be disputed that the electrical interests dominate, they certainly outnumber the gas fraternity.—"O."

CURRENT COMMENT.—

WITH sorrow we chronicle the death of Mr. Sedgwick Dean, whose connection with the gas interests of Michigan, through his ownership with his brother (Mr. H. S. Dean, Regent of the State University of Michigan) of the Owosso gas plant, and his untiring efforts for the advancement of the Michigan Gas Association, made his name a household word for years amongst the gas fraternity of the Middle-West. His summons came the morning of the 14th inst., and the end was shockingly sudden. Retiring the night of the 13th inst. in his usual good spirits, he arose early the following morning. Having dressed himself for the street (he was stopping at the Hotel Wildermuth) he staggered and fell in an apoplectic stroke, the effects of which were so virulent as to cause his death some hours after the discovery of his condition, which was made by a bell-boy calling at the door of the room of deceased. He was fully dressed for the street, as he proposed that morning to leave for Detroit at an early hour. Our knowledge respecting the details of his life are quite meager, but we expect next week to give further account thereof.

A COMPLETE new gas works is to be erected in Mt. Carmel, Ills., and the contracts for the apparatus complete have been awarded to the Gas Machinery Company, of Cleveland, O. The apparatus includes a 5-foot water gas apparatus, complete, with meter, purifiers, holder and all other miscellaneous parts. The new buildings are now under construction and the plant will be operated in conjunction with the Mt. Carmel Gas and Electric Company's electrical installation.

MR. W. W. GIBBS has resigned from the directorate of the Welsbach Company. His successor on the Board is Mr. Morris L. Clothier.

THE Massachusetts Legislature will in all likelihood sanction the bill which proposes to remove the limit at present stipulated in the authority permitting gas and electric lighting companies to issue capital. Under the law the the capital stock is limited to $1,000,000, but the proposed amendment will permit increases to such amount as may be authorized by the Board of Gas and Electric Light Commissioners.

[No. II.]

Review of the Twenty-third Annual Report, Board of Gas and Electric Light Commissioners, Commonwealth of Massachusetts.

[Prepared for the JOURNAL by MR. H. THURSTON OWENS.]

Included with the number of gas companies are four which make oil gas, one being municipally conducted, and 14 acetylene companies. The results of tests of the former for candle power ranged from 25.15 to 48.90. Two companies supplying acetylene gas were inspected, the tests showing 155.80 and 202.05-candle power, respectively.

Meter Testing.—Comparing the results of meter testing in Massachusetts with those of the New York city (Public Service Commission, First District) it can be noted that, in the former for 1903, the number of meters tested on complaint represented nearly 3 per cent. of the total, whereas in 1907 the percentage was only one-half of one. In New York city, from July 1, 1907, to May 1, 1908, meters to the number of 240,306 were tested, of which nearly 3 per cent. represented complaints, while of 30,779, for April, 1908, the figure was reduced to 2 per cent.

The figures given for Massachusetts are for 11 months only, owing to a change in the fiscal year of the State, and it is curious to note that over four times the number were tested in New York city for 10 months, the population in the latter being slightly over one-third greater than that of the State of Massachusetts.

Companies and Stockholders.—An indication of the thoroughness with which the subject of supervision has been dealt with is exemplified in the tables covering localities supplied, population, capital, whole number of stockholders, number of stockholders resident in Massachusetts, and the value at par of stock held in the Commonwealth. Of the stockholders of gas companies 81 per cent. reside in the State, the percentage on like account in the case of electric companies being 83.

Accidents.—The report includes a very interesting and complete statement of accidents, fatal and non-fatal, due to gas and to electricity. It is interesting to note that there were no cases due to either explosions or leaks from street mains among the fatal cases, but among the non-fatal cases, which numbered 143, 14 were due to explosions and 24 from leaks in street.

Self-Closing Devices for Burners.—The work of the Commission regarding accidents has not been confined to compiling and reporting the number and the cause, for an investigation was carried on covering self-closing devices. But these matters were thoroughly brought out in the JOURNAL at the time the investigations were being made. The report under this head is lengthy, explicit and interesting.

Price of Gas.—The average price throughout the Commonwealth has again decreased. The figures for 1886 were $1.72; 1896, $1.17; 1906, $0.998; 1907, $0.948.

The Commission estimates that the average price paid by consumers, to the companies selling annually more than 30,000,000 feet, is $0.923, and if the Boston Company be excluded, the average would be $0.98. This last figure is probably very close to the average for the country.

Taxes.—The assessed valuation of the gas plants is approximately $32,500,000, and the total amount paid by the gas companies for taxes has again increased. The amount for 1907 was $630,790.33, being an increase of $49,149.02 over 1906. Figured in cents per 1,000 feet sold this would represent an average of 6.4 cents for 1907 and 6.5 for 1906. In 1903 the average was only 4.3 cents per 1,000 cubic feet sold.

Among the coal gas companies the average ranged from 2.91 cents, at Spencer, to 12.14 cents, at Milford, the price at which gas was sold in these cities being $1.64 in the former and $1.76 in the latter.

Comparing the financial operations of gas and electric companies the Commission reports the following results: Companies that did not earn expenses - 1906, gas, 5; electric 4; 1907, gas 4; electric, 1.

Companies That Have Not Declared a Dividend.

	1906.	1907.
Gas	25	21
Electric	26	27

Companies Showing a Surplus.

	1906.	1907.
Gas	63	64
Electric	49	49

Companies Showing a Deficit.

	1906.	1907.
Gas	10	9
Electric	11	10

A further analysis of these figures reveals the following results by companies:

	Straight. Coal Gas.	Combination. Coal Gas and Elec.	Oil Gas and Elec.	Acetylene Gas.	Total.
Companies not paying dividends	11	3	1	6	21
Companies paying dividends	26	19	2	4	51
Private owners, not reporting	..	..	..	4	4
Total	37	22	3	14	76
Range of dividends, in percentage	3 to 18,	5½ to 12,	5 to 6,	3 to 5.	
Range of dividends, in amount per 1,000 sold	$.1438 to .5303	$.8135 to 2.2492			

The Control, Design and Construction of Gas Appliances.

[Prepared for the JOURNAL, by MR. WALTON FORSTALL.]

One who has been in intimate touch with a situation where in 8 years nearly 300,000 consumers have been provided with gas ranges and water heaters, and now require 100,000 calls each year to maintain their appliances in proper adjustment and repair, would very naturally be interested in reading the paper of Mr. J. C. D. Clark, on "How Far Should a Gas Company Go to Maintain the Efficiency of Gas Appliances?" for Mr. Clark deals with a constituency at least 50 per cent. larger than the figures just given.

Mr. Clark states an axiom when he says: "What a splendid thing it would be for the gas companies if they had absolute control over all the gas appliances that are used on their lines." He also writes, "Another plan to obtain control of appliances is to see to it that the new appliances that are installed on lines are *constructed along the right lines*, then, by a system of inspection, see to it that they are kept in good order, and that they are giving good satisfaction." The italics are mine, and the words thus emphasized will serve as a text for this article.

A few words first about controlling the class of appliances used by the consumers; and, at the outset, let me state that all my remarks will be confined to the ordinary domestic type of gas range and water heater. The most effective way of insuring that only approved makes of appliances will be bought by consumers is to provide that the connected price of such approved makes will be lower than that of makes not approved. This is easily done when the policy of the company is to connect every new appliance free of charge. In such a case the company might keep the sale of appliances in its own hands, refusing to connect free any appliance not sold by it. I believe, however, the policy of not discriminating in respect to charge for connection between any approved appliance, whether sold by the company or not, combined with the allowance of a small commission on outside sales, is worth its cost, for it results in every seller of appliances being willing to handle only approved appliances, and prevents the imposition on the gas consumer of an appliance which can be sold so cheaply that a dealer without conscience could connect it free (rubber hose, ⅜ pipe, etc.), at a price below that charged by the company. Of course, where the company charges for connection the necessity for giving the dealers a commission is quite urgent, if there is to be any control of the sale of appliance.

I believe that, in many cities, th. companies have been able, by one means or another, to insure that the majority of the appliances bought by their consumers were of an approved type. I believe too that this has meant, in most cases, ranges and water heaters made by people of good repute, from satisfactory material and of efficient design, but I also believe that, except perhaps in a few instances, there has been no attempt made to standardize the details of construction, and that each year, as the makers changed their design in experimenting for better results, or perhaps only in the search for novelty or an attractive appearance, such new makes have been ordered without question. Also, from time to time, new makers have been dealt with and old ones dropped if they happened to be high bidders.

As a result of the above policy, most companies find that there are to-day in the hands of their consumers appliances representing many makes, and still more changes in design. This entails, in order that anything like prompt attention may be given to repair work, the maintenance of an extensive stock of repair parts. Again, no matter how large a stock is kept there will be many parts required which will not be in stock, and there result orders on manufacturers, an outlay of time and expense in correspondence and expressage, many misunderstandings and wrong parts received, and, after all this effort, often consumers dissatisfied because of the long delay. However, if these complications, connected with repair work, were the only result of what might be called the *laissez faire* policy as to appliance design, the situation might be regarded with a certain amount of complacency, for, in most instances, repair work is charged for, though it is true this charge does not usually cover the cost of the first call to find out what is the nature of the trouble. Where the shoe really pinches, as those companies know who have carefully analyzed their appliance complaints, is at the point where such an analysis shows that the largest amount of complaint work, due to appliances, is caused by leak at burner cock, mixer out of adjustment, leak at cement joint of burner, explosion due to failure of oven pilot-light to work, etc. The pain is not decreased by discovering that A's appliances are much worse in one or more of these respects than B's, until it is easily seen that, if all the appliances in use were of a type combining every good point and omitting every bad one, the yearly saving in appliance complaint work, to say nothing of the decreased annoyance to consumers, would be very welcome.

No blame for this state of affairs should attach to the appliance manufacturers. On the contrary, the gas industry is much indebted to the pioneers in appliance work for their perseverance in pleading with gas companies year-in-and-year-out to adopt a liberal policy in regard to placing gas appliances. Many a gas company and its officials were started on an appliance policy rather against their own ideas, because some gas stove manufacturer kept after them to try a carload of ranges, and now perhaps believe that the success that followed this first adventure is entirely due to their farsightedness. The appliance manufacturers have been furnishing to the gas companies the kind of appliances which they believed the companies wanted, aad in many, if not in most, instances the changes made from year to year have been due to some hint from a gas company employee. The manufacturers are in no position to know the weak points in their appliances, as shown by the complaints of consumers, unless this information is supplied by the gas companies, and there is good reason to suppose that the latter too often do not take the trouble to analyze their appliance complaints, and to profit by the knowledge so obtained.

The appliance situation is somewhat similar to the meter situation, previous to the advocacy of the "A" meter. The meter manufacturers were furnishing a meter of a type that had always proved satisfactory to the gas companies, and naturally they considered that any request for a changed construction should come from the companies. Now that the "A" meter has been suggested, and has justified itself, meter makers stand ready to supply it.

Mr. Clark's remedy for the appliance situation is "that the manufacturers would do well to standardize their appliances, which might be approved by a board of appliance examiners," and he proceeds to explain that this board might be a joint one, representing the American Gas Institute and the National Commercial Gas Association. I think this programme contains two radical defects, sufficient to prevent its successful completion. First, the sellers are to standardize their article; second, the users are to be represented by an association committee. As to the first defect, the sellers want to make what the users will buy, and each manufacturer will desire some particular feature, because his best customers want this feature. So the manufacturers would find it impossible to agree among themselves, because they could not agree as to what *they* thought the users wanted; and this brings us to the second defect, which is that an association committee would find it impossible to decide on standard types acceptable to all the companies. The experience with pipe standards shows this. Also, the work entailed on an appliance judging committee would be far too expensive to be done by any one set of men not especially paid for the purpose and devoting their whole time to the work. It is needless to say that our gas association work is as yet not taken seriously enough by the gas industry, to provide funds sufficient for a staff of permanent association employees.

No; the problem of appliance standardization must be first attacked by the individual companies, and there are certain indications that at least a few of the larger companies are moving in this direction. Every company should be in a position by this time to know how ranges and water heaters should be designed and made, to minimize complaint work and give efficient results. Specifications covering every detail of each type and size of appliance to be handled should be prepared, the probable yearly needs estimated, and then in October various appliance manufacturers asked for bids for the coming year's supply, the bid being based on a fixed quantity, with probably an option to increase the order by a certain amount. It is perfectly feasible to thus order appliances in the fall for the next spring and summer, and to give the monthly deliveries quite closely. The large companies that handled their appliance business in this way, would be able, even at the start, to buy as cheap, if not cheaper than by the present method of accepting the designs furnished by the manufacturers, but not placing orders until February or later, forcing the factories to work under pressure, with the frequent result of poorly assembled goods, and low or even exhausted stocks. Subsequent years would show a saving over existing methods.

The small companies would probably be quoted a higher price for their own design than for that offered by the manufacturer, but if the latter were making a line of appliances for some large company from their design, this design would be available to the small company at a price probably as low as the manufacturer's design, and, unless

local conditions were very different, it is probable that the design approved by the large company would prove more satisfactory in the long run to the small company than the design it thought it wanted. For it seems a very reasonable assumption that the appliances specified by the large companies should represent the result of a wide experience with the consumer's needs and troubles, and also the result of conferences with the manufacturers. Any manufacturer starting to make such appliances would find it greatly to his interest to persuade other companies to adopt them, and thus the tendency would be to crystallize on certain standard types, and practical uniformity might be obtained for large sections of country, though as between (say) East and West, there might be always distinctive types representing different ideas as to the preparation of food.

This brings up another point, viz.—the geographical relation between manufacturer and company. In our individual capacity we deal with a nearby druggist and grocer, and companies preferably buy their supplies from local dealers. Gas appliances, however, have often been bought from manufacturers hundreds of miles away, because of their reputation and the attractiveness of their wares. When companies begin to standardize their appliances, the local manufacturer will be given a decided advantage. A comparison of certain conditions will make this plainly evident. At present, the company orders (in February) 5,000 ranges from a distant manufacturer for delivery as soon as possible. As fast as the carloads arrive the ranges are taken to the company's storeroom (one or more), and from there delivered to consumers as sold. In the future, however, a local manufacturer would have his order some time before Christmas, calling for 5,000 ranges to be delivered approximately, so many month by month, from his factory *direct* to the consumer, as per directions received daily from the company. This programme involves a saving of at least 50 cents on each stove in delivery, without mentioning the saving in storeroom space to the company, and the saving in interest to the manufacturer in being able to order his raw material and make up his goods just as needed.

This standardization of appliances is bound to come as one of the results of the universal recognition, on the part of every company supplying an article, that maximum sales result only when the user is aided in every possible way to use the article to the best advantage. This means, of course, the most satisfactory range, water heater or room heater, where gas is sold for heat, and the most satisfactory lighting appliance where gas is sold for light. Every day advertising pages all over the land tell of the value of oil for heat and light, if burned in appliances designed and sold by the Standard Oil Company, which has found such appliance design and sale of the greatest value in increasing the oil output. Gas has definitely relegated oil to a subordinate place, but the gas companies will find good profit in enabling their consumers to buy appliances which represent closer attention to small details than is true of the appliances now generally sold.

The Light and the Burglar.

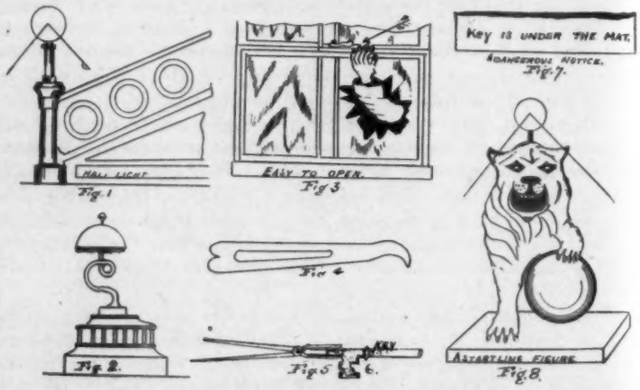
[Prepared for the JOURNAL by "R."]

At last, after years of thievery, losses, experimenting with patented burglar alarms, etc., the men who know report that, after all, the most effective way to protect a house or office from a night raid is to keep up a light. During the past generation numerous devices have been invented for preventing burglars from entering windows, doors and various other openings; but the burglar, having determination in his makeup, is not stopped by these contrivances. Having his kit of devices to work with, he is able to open windows and doors; but it has been proven that the burning light in the home or shop phases him, for he does not know whether or not there is someone nearby. The light may be burning as a precaution, and there may be no person within a mile; but night robbers detest lights. They prefer to have nothing to do with a residence in which a light is burning. Dark shadows are preferred. The dark lantern in the hands of a burglar is all the light the burglar appreciates or wants. He can control that light; but if a light is burning in the store, or in the room of a house, that light must be extinguished before the raider can operate in safety. Rather than take the chances of entering and putting out the light, the man will pass by to some other establishment where things are more convenient. If the burglar decides to enter and turn out the light he is taking the chance of getting shot.

The light may be within the horizon of a detective who is ready to shoot. Someone is usually about when there is a light burning. Therefore, during the year or so, there has been quite an active request for burglar-proof lights; that is, night lamps calculated for the purpose of frightening off intruders. Your correspondent finds that, in many of the residences of the rich, the night light, or the robber lamp as some call it, is placed in the hall. A good form of hall light for this service is shown in Fig. 1. The light is made so as to cast strong rays downward, wherefore the upper part of the hall and the stairs are quite in the shadow. A burglar gazing into the hall through one of the plate glass fronts of the door would observe this light cast about the lower part of the hall, but he would not be able to distinguish objects on the stairs. This mystifies him; in other words, bluffs him; and the professional, in fact the novice as well, takes no chance in the dark. The imagination would lead the would be thief to assume that someone is on the stairs in the darkness. Therefore, rather than take the chances, and owing to the fact that courage wanes under such circumstances, and because there are other places suitable for looting nearby, the burglar passes on and you go free while your careless neighbor who keeps things dark and handy is honored by a visit from the man who passed you by. Of course, any kind of a light will do. You can burn a candle, although grease spots may happen and the candle burn down and out before daybreak.

Oil lamps can be used to advantage, although they are not so safe for night service as gas or electricity. Besides, the oil lamp, when turned down low, as it usually is for night work, gives out an odor which some do not like. You can burn gas to the best advantage. This night lamp can be made to do evening work as well. Fig. 2 is a drawing of one example that I saw in use for this purpose.

In the next cuts we are shown a few of the modes of entry by the burglar. One party who told me that he intended to burn a light in the future found that the patent burglar-proof window catches failed



because the burglar pasted some cloth over the window pane, then pushed his hand through without making a noise. Then with his hand he manipulated the device from the inside, as in Fig. 3. Then he opened the window, entered and got off with the silver. Window catches are often opened by slipping a thin piece of steel through the juncture of the frames, from the outside. This steel is shown in Fig. 4. Then, using the steel as a lever, the catch is pushed over and the window opened. Sometimes the door key is turned with a pair of strong, steel nippers, by slipping the thin jaws over the end of the key on the outside, as in Figs. 5 and 6. Then the key is turned and the door is opened.

An ex-burglar told me that he was often accommodated by housewives who placed the key under the mat for "John," and gave due notice of same in writing, as in Fig. 7. This notice would be pinned to the door, so that "hubby" in getting home first would have no trouble in finding the key; but my burglar friend stated that he often got there ahead of "hubby," and made good and active use of the information thus imparted.

Mechanical devices for stopping burglars from entering are to be commended, but you will find a simple and effective manner of making burglars avoid your property by burning a night light. Your house will not be popular with burglars so long as there is a light going. Merchants and bankers know all this and they maintain a light in their establishments all through the dark hours. A light sets the looter to guessing, and when you get him guessing you have him going, and he soon gets out without molesting your goods.

Of course, smart men have taken advantage of the light and the burglar problem long since. One ingenious man devised the startling figure of a lion with open jaws, all in white material, so set on a table in the hall, with the gas light shining thereupon, that any per-

son would get a shock upon gazing through a window at the same. No doubt the thing startled burglars off in its time. I am told one man had a light burning dimly in a hall where a white sheet was wound to resemble a ghost, which sheet moved in the air currents just enough to give an intruder a shock; but, after all, the simple burning gas jet fills the bill. The police will tell you that it is seldom a house is looted when there is a light burning in it somewhere.

FOURTH ANNUAL MEETING, SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION.

HELD IN EL PASO, TEX., MAY 7, 8 AND 9, 1908.

FIRST DAY—MORNING SESSION

The Fourth Annual Convention of the Southwestern Electrical and Gas Association was called to order Thursday morning, May 7, by President H. T. Edgar, in the parlors of the St. Regis Hotel, El Paso. Mr. Edgar then

INTRODUCED THE MAYOR OF EL PASO,

Hon. Jos. U. Sweeney, saying: Ladies and Gentlemen – I know of no greater pleasure than to be permitted to call to order the fourth annual convention of our Association in this city, which was my home for over four years. It was here I obtained my first experience in street railroading, and the acquaintances and associations which I formed during that brief period will remain a pleasant memory with me as I live. When I came here, a little over six years ago, this city was scarcely more than a small border town, and in that brief period it has grown to become one of the most beautiful cities in our State. If you will take the trouble to look about you while here and observe, you will discover that the regulations of this city are the best. I think I can safely say, without fear of contradiction, that the city of El Paso is the best governed city in the State of Texas. It is my province this morning to introduce to you the man who is responsible for this good government, so I take pleasure in presenting to you the Hon. Joseph U. Sweeney, Mayor of the city of El Paso, who will now address you.

THE MAYOR'S GREETING.

The Mayor was in a particularly happy frame of mind when he arose to welcome the delegates to the Pass City, and made everyone feel at home with the following greeting remarks:

Mr. President, Ladies and Gentlemen: Mr. Edgar was very flattering in his speech in reference to the city of El Paso and its government, and I appreciate his remarks. El Paso is delighted to be able to greet you in convention here this morning, and I believe I voice the sentiment of the entire community when I state that we hope your visit will be a pleasant and profitable one. Mr. Potter wanted me—I believe it was Tuesday night he specifically requested - to order the police force to be extremely lenient with you gentlemen. [Laughter and cries of "Hurrah for Potter."] He stated that a year ago he was a delegate to the convention in San Antonio, and he knew how you gentlemen acted away from the watchful eyes of your wives. [Laughter.] He stated as a reason for making the request that he was standing on Commerce and Alamo streets – in the vicinity of a saloon, I suspect [laughter] – when a crowd of delegates came along; he said they were gas men [laughter], captured him, and against his protest took him in. [Laughter.] He said they made him attempt to drink a highball; that he resisted so furiously it was necessary to call out the police reserve; and he stated that he did not want anything like that to happen here [laughter and applause], for he thought it would possibly be a reflection upon the electric light and street car men, and he wanted to protect them. [Laughter.] Now, gentlemen, I want to state that it is a pleasure to be enabled to greet you this morning, and I extend to you a most hearty and sincere welcome to our city. I thank you. [Prolonged applause.]

RESPONSE BY MR. COOPER.

The address of welcome was responded to on behalf of the Association by Mr. H. S. Cooper, of Galveston, who said:

It is always a pleasure and a privilege to respond to an address of welcome to the Association, and in this instance it is an especial honor—a double one in fact. In the first place, the welcome has been such a hearty one that it needs a good, strong response. In the next place, the welcome has wiped away a lingering doubt that has been in the minds of a good many of us since last year. When you stood here and looked over the faces before you, I do not suppose it occurred to you that we were the enemies of the State and of good citizenship, and yet we have been told for quite a long time that we were such, because pretty nearly every gentleman here represents a corporation —some few of them are the whole cheese. [Laughter.] In your official capacity, of course, you must have had some dealings with corporations in this town, especially public service corporations, and I do not doubt that, while you found they asked for the heavens above and the earth beneath and the waters under it, they did not ask for all of it. All they ask for up in the air is that they can puncture it with copper wires of indefinite length; and when it comes to the earth, they want to use a portion of it for rails of indefinite length, and they want to fill it up with nice ditches and things and ask for the water. The State says we have plenty of water if we will squeeze our securities. [Laughter.] Last year we were made to feel very humble at our meeting at San Antonio. We felt especially so because that was right after the adjournment of the Texas Legislature, and you know that the Texas Legislature went gunning for us, and blamed us when we dodged. In fact, we were given to feel that we were a kind of yellow dog. We are so used to kicks that we are really getting callous in places. As I say, we were made to feel humble, and when your representative came to the convention from El Paso and offered us this as a meeting place, telling us we would have a warm reception here, and while we did not doubt his word in any way—because he was a street railway and electric light man [laughter]—we knew he believed a good part of what he said. Still, some of us had a lingering doubt whether you really wanted us, or whether it was a chivalry which prompted a courtesy to the under dog. But, I say that doubt has been dispelled from our minds by your welcome. The warmth of your welcome has dissipated it like mist in the sun. Three years ago in Galveston an organization from the East hung their banner on the outside of the car when they came, and this inscription was on it: "It is a long way to Galveston; but we are here." I think on our banner we can amend that slightly by saying: "It is a long way to El Paso; but we are here, and we are glad we came." [Applause.]

At the close of Mr. Cooper's address, Mayor Sweeney left the convention hall, the delegates giving three cheers for El Paso's Mayor.

ROUTINE BUSINESS.

The convention then settled down to business. The President said the first thing for their attention was the presentation of candidates for membership in the Association.

ELECTED TO MEMBERSHIP.

Secretary Stichter read the names of 36 Companies whose applications had been approved by the Executive Committee.

Mr. Cooper, Galveston, moved that the applications be accepted; and, further, that the officers who had been instrumental in securing such a large increase be commended by the Association, as it was the largest increase in any one year in the history of the organization, and that the thanks of the Association to the officers for their good work be spread upon the minutes. This motion was seconded by Mr. Kellogg and carried.

The President stated that the minutes of the San Antonio meeting last year had been destroyed, and called upon the Secretary to explain to the Association how it happened that there were no complete minutes of that meeting.

The Secretary replied by stating that the stenographer who had reported the proceedings last year had his notes destroyed by fire, and, therefore, the Association was having to rely upon a general report of the convention, as contained in the "Southwestern Electrician."

PRESIDENT'S ADDRESS.

The President then read his annual address as follows:

To the Members of the Southwestern Electrical and Gas Association —Probably the most important matter that came up during the past year of particular interest to our Association was the question that arose in the city of Dallas relating to the establishment of a municipal lighting plant, and compelling the street railway companies to charge a fare of 2 cents only to those passengers who were unable to get seats. Under the Dallas city charter, matters of this kind could be submitted to a vote of the people by obtaining the signatures of 5 per cent. of the qualified voters to a petition to the City Commissioners demanding an election. The necessary signatures were obtained to this petition and the election was held Tuesday, April 7. One of the propositions was that the city of Dallas should appropriate $50,000 towards the erection of a municipal lighting plant. The other proposition was an ordinance compelling street railway companies to carry

all passengers for 2 cents who where unable to obtain a seat after riding 2 blocks. These measures were opposed by the Mayor and Board of Commissioners, the Commercial Club, the One Hundred-and-Fifty-Thousand Club, and the business interests of Dallas. In the end both of these propositions were overwhelmingly defeated, and I think Dallas is to be congratulated upon the stand which she took in these matters. I further believe that this decided victory for conservatism and fair dealing with public service corporations will have a good effect throughout the territory covered by this Association.

During the year, several of the new laws passed by the Thirtieth Legislature affecting our interests went into effect. The principal ones are those relating to taxes, and, so far as I have been able to learn, all of the Companies in this Association have attempted to comply with the tax laws in every particular.

During the past year two meetings of the Executive Committee were held, at the office of the Secretary in Dallas, the first meeting being held in December, the second meeting in March. At the first meeting all of the members were present but 2, and at the second meeting all the members were present but 4, showing a great interest in the meetings of this Committee. The proceedings of the meetings were printed in pamphlet form and distributed to the members of the Association. I strongly recommend that in the future the Executive Committee meet at least twice each year, to take up, discuss and decide Association matters; that full detailed reports be made of these meetings and a copy of the same sent to the members of the Association. The reports of these meetings of the Executive Committee impress the members of our Association with the fact that the Committee does not exist merely in name, but that it is an active, working Committee, looking at all times after the interests of the Association.

During the year your Secretary has, acting under instructions from the Executive Committee, collected from the active members statements showing the amount of taxes paid during the years 1906–7. This information is now on file in the office of the Secretary, and it is simply necessary to compile the same in proper form to have it available for the use of the Association. I recommend that the Secretary continue his efforts in obtaining this information, and that he obtain similar data for the year 1908, so that, when the Legislature meets in January, 1909, we will have available for our use the record of three years of taxes, donations, etc. I want to urge upon the active members of this Association the great advantage to them of sending this information to the Secretary and to urge this particularly upon the members representing the smaller companies. Experience has taught us that the affairs of the smaller companies interest the members of the Legislature much more than the affairs of the larger companies, and that it is of the utmost importance that we have the data from the small companies. The expense of going to Austin has kept a great many representatives of the smaller companies away, and they can assist the Association very materially by forwarding this information to the Secretary.

For the first time in the history of this Association, a souvenir programme has been printed. The Secretary, acting under authority of the Executive Committee, has entered into a contract with certain parties for the printing of these programmes. Under the terms of this contract, the programmes are to be printed and distributed to the members. The minutes of this meeting are to be taken down in shorthand, transcribed, and afterwards printed in book form, all of this being done without expense to this Association; and, in addition to this, the Association is guaranteed a minimum of $300 from the proceeds of the advertising in the souvenir programme. This will give us printed, bound copies of the proceedings of this meeting. I recommend that, if the Association finds itself in sufficient funds after the meeting, the proceedings of the other meetings of the Association be printed and bound in book form and distributed to the members so that we shall have a permanent record of all our proceedings. Unfortunately, the minutes of the proceedings at San Antonio were destroyed by fire and these are, therefore, lost to the Association.

The associate members have shown a great interest in the Association during the past year and have been very active in bringing it to the attention of a great many companies which are not members. This interest on the part of the associate members is further evidenced by the largest display of exhibits in the history of the Association. I recommend that at all future conventions sufficient space for exhibition purposes be obtained by the Association and furnished free to the exhibitors, and that a plan of such space, together with all information necessary, be sent to each associate member and published in the trade JOURNALS at least 4 months before the annual convention, thereby giving the greatest publicity to the fact that this Association welcomes the supply man and his exhibit by offering every inducement to him to attend our convention and join our Association. I think the active members of our Association recognize the obligations we are under to the associate members, particularly at the time of our annual conventions, and I think I am safe in saying that our annual conventions would not be successful without the presence of the supply men and their exhibits. Therefore, I hope that the active members will remember this by favoring the associate members of this Association in every way possible.

I feel sure you will be proud of the 1908 Question Box, so ably edited by Mr. Samuel Kahn, of San Antonio. The interest taken in it by the members and the very complete manner in which it has been edited should be a source of much gratification to all.

I want to urge upon the Nominating Committee the importance of care in selecting your officers and Executive Committee for the coming year. The collecting of data relating to taxes should be but a step toward the collection of much additional information for the use of the Association. The selection of El Paso for the meeting place this year will undoubtedly interest many companies in Western Texas, Arizona, New Mexica and Mexico, and with proper efforts large additions can be made to our membership during the coming year from this section.

These and other important questions will be matters for your Executive Committee to consider during the year, and I recommend that you select those men who are willing to attend the meetings of the Executive Committee and give some time to the work of the Association, and who are also willing to attend to legislative matters the coming winter.

I recommend that the Secretary be given the authority, with the approval of the President, of appointing an Assistant Secretary who shall maintain an office of this Association in Dallas, who shall have charge of and be responsible for all records of the Association, and who shall work under the direction of the Secretary; and that the Secretary shall pay to the Assistant Secretary such part or all of his salary as may be necessary to secure his services.

I believe that the membership of our Association can be very materially increased, and that this can best be done by the present members, both active and associate, using every effort to get new members. The active members can present to the various traveling men who call upon them the advantages of having the companies they represent become associate members, and the traveling men throughout this territory representing those companies that are associate members can bring to the attention of the operating companies that are not members of the Association the advantage to them of becoming active members; and I trust that all of the members will constantly bear this matter in mind and during the coming year use every effort to increase the membership.

I recommend that the Secretary be instructed to furnish to the active and associate members of the Association a certificate of membership. This certificate should be given to those members who have paid their dues, the same to be signed by the President and Secretary, and I recommend that each member receiving this certificate of membership have it framed and hung up in his office.

I recommend that the members of this Association, and particularly the associate members, be requested to wear at all times the standard button of the Association which has been adopted by the Executive Committee, the design of which it is hoped will meet with the approval of the members and remain the permanent badge of the Association.

It might not be uninteresting at this time to review briefly some of the important recommendations made by the Past-Presidents of the Association, and to learn whether or not any of these recommendations have been carried out.

President Strickland, at Denison, in 1905, recommended that a permanent office of the Association be established. The Committee appointed to act on the President's address recommended, in addition to a permanent office, a permanent Assistant Secretary. This recommendation was carried out during the administration of President Phinney, who selected Dallas as the headquarters, but who was very unfortunate, as he stated in his address at Galveston, in selecting men for the position who were later compelled to leave Dallas. At Galveston another effort was made to have a permanent headquarters in the selection of Mr. E. B. Meginness, of Dallas, for Secretary, but he also was compelled later on to move away. The Executive Committee filled his place by the appointment of Mr. R. B. Stichter, of Dallas, and although Mr. Stichter served as Secretary during the Association year, 1906–1907, it was reserved for the San Antonio meeting, in 1907,

to definitely fix Dallas as the permanent headquarters of the Association and to decide to pay the Secretary a salary.

During the year 1907–1908 the Secretary has been extremely active in furthering the interests of the Association, by the collection of data referred to in another place and in keeping the members fully advised of the progress of the work of the Association.

The Committee on Relations, appointed at Denison in 1905, apparently did nothing. This, I believe, is an important matter, and I recommend that another Committee on Relations be appointed with instructions to attempt to do something the coming year. The larger national Associations, representing the various interests that our Association also represents, have very complete data on file in their Secretary's office, covering all questions of interest to our business, and we should attempt to make some satisfactory arrangement with these national Associations, whereby our Association could, in case of necessity, have access to the data and records on file with the national Associations, and at the same time furnish them with any data our Association has. I recommend that 4 men be appointed, 1 representing the electric light interests, 1 the gas interests, 1 the street railway interests, and one the telephone interests, with instructions to correspond with the Secretary of the National Association, with a view of making some arrangement of this kind.

President Strickland also recommended the appointment of a Committee on Municipal Ownership, but, so far as our records show, this committee was never appointed, and if it was it never did anything. There is so much data at the present time on this subject that I suggest, in case any company confronted with this problem and desiring information should communicate with the Secretary, who can arrange to furnish it to them.

President Phinney, at Galveston, in 1906, recommended the appointment of a legislative committee to appear before the various committees of the Legislature and present facts and figures to its members. This committee was not appointed by the Association, but later in the year the Executive Committee met in Dallas and appointed three chairmen of committees; one to represent the electric light, one the street railway, and one the gas interests of the Association, conferring on each chairman the power to appoint the balance of the committee These committees were very busy during the session of the Thirtieth Legislature, and their reports were made to the San Antonio meeting. The Legislature meets again in January, 1909, but I do not consider it necessary for the Association to appoint a legislative committee, as this is a matter I think should be left to the Executive Committee.

I desire to take this opportunity of expressing to the officers and members of the Executive Committee my appreciation of their cooperation with me in the work of the Association during the past year, and I desire particularly to call to the attention of the Association the very excellent work which has been done by your Secretary, and to express the hope that the next Secretary of the Associatien will continue the good work which has been started by the present Secretary.

Vote of Thanks to the President.

On motion of Mr. Cooper, of Galveston, numerously seconded all over the hall, the thanks of the Association were tendered to the President for so thorough and practical an annual address. This motion was put by the Secretary and was unanimously carried, eliciting from Mr. Edgar his thanks for the appreciation of his endeavors.

On motion of Mr. Kellogg a committee of five was appointed by the chair to act upon the recommendations contained in the President's Address.

A Statement from the Secretary.

Secretary Stichter addressed the convention, saying: I would like to make a statement regarding that portion of the President's Address in which he refers to the collection of data with reference to taxes, etc. We have not received replies for the information asked from all of the plants by any means. There will be plenty of blanks on the desk here, and I would be pleased to have any of you who have not been supplied with them to help yourselves, and to forward them to the Secretary's office as soon as you get home, and see that the information called for is properly filled in.

A Telegram.

The Secretary then read a telegram from Mr. J. F. Strickland, President of the Texas Traction Company, which Company is building an interurban railway from Dallas to Sherman, Tex., expressing his best wishes to the Association, and regretting his inability to attend. There being no further routine business before the convention, the President introduced Mr. C. H. Ladd, of Forth Worth, who, in the absence of Mr. Lowd (of the Stone & Webster Company), read the following paper by the latter:

TRACK CONSTRUCTION.

It is the intention of this article to deal briefly with "Tee" rail construction in paved streets, this being the type of construction which the writer believes best for the operating companies from the standpoint of first cost and economy of operation.

In many cities the type of rail is designated by ordinance, unfortunately in most cases specifying grooved rail. These ordinances were largely the result of a lack of attention and inexperience on the part of the railway companies in the early days of electric traction. Emerging from the days of the horse car to the heavier electric car, the railways were confronted with the problem of securing a rail suitable for the new conditions confronting them. The old "strap" rail, the light "Tee" rail and light "girder" rail were all found inadequate, it being impossible to maintain either a satisfactory rail or a well kept pavement. The manufacturers gave us the girder rail of greater height and weight, in various forms, and the grooved rail, also of greater weight. It is probable that the first good results in paved streets were obtained by the use of the girder and grooved rails, and this is the principal reason that so many cities demand the use of such rails to-day.

With the increase in weight and height of the "Tee" rail occasioned by the needs of the steam railroads for heavier rail to meet the requirements of high speed and greater weights, there came an opportunity to demonstrate that the "Tee" rail could be used in any kind of a paved street with excellent results, both in regard to car operation and maintenance of roadway. The "Tee" rail has many advantages over either the girder or grooved types, and no disadvantages that are known to the writer, and it is preferred for the following reasons:

1. It is designed on better mechanical lines; there is no eccentric loading as in the case of the grooved rail.
2. There is no excessive waste of metal when heavy traffic and large wheel flanges are to be considered. In many cities grooved rails weighing from 125 to 150 pounds per yard have been used, where an 80 or 90-pound "Tee" rail would have been sufficient.
3. The flangeway is always ready for an increase in size of wheel flanges of the local cars, or for the interurban car with the large flanges necessary for high-speed work.
4. The "Tee" rail is not as noisy.
5. Car wheel maintenance is less.
6. It has a longer life, particularly at the joint, which is the vital point of any rail.
7. It is more easily handled, and high-priced shop curves are unnecessary.

Considerable discussion has taken place on the question of the use of standard "Tee" section instead of the high "Tee" or "Shanghai." The standard section has the advantage of lower cost, being some $8 a ton less than the high "Tee," so that for the same money one can get a heavier rail by the use of the standard section. But with any character of paving the height of the rail should be considered first, and unless an excessively heavy standard rail is used, say from 90 to 100 pounds per yard, which in most cases is unnecessary, the needed height can be obtained by using a lighter section of high "Tee" rail. A 7-inch "Tee" rail is recommended as giving the necessary height. The base of the rail can be well imbedded in the concrete, thus increasing the rigidity of the rail and preventing to a great extent the loosening of spikes and other fastenings. Even with the use of a 90 pound standard section, the necessary height to give the best results can hardly be obtained.

It is admitted that the standard section is mechanically stronger and has more metal in the head, with consequently a slightly longer life; but after considerable experience with many kinds of pavement, the writer believes that the 7-inch "Tee" rail meets every requirement. In this connection attention is called to the fact that the use of the 7-inch "Tee" rail was recommended by the Committee on Rails at the 1907 convention of the American Street and Interurban Railway Association.

Both the "tie construction" and the "stringer construction" may be used with the concrete foundation, though the concrete stringer construction should not be used unless the sub-grade is well drained and of good hard sand or gravel. The "tie construction" is always

reliable, and will be considered in this article, time and space preventing a discussion of the "Stringer."

Sub-grade.—The sub-grade should be well drained. This is very important, but in some places local conditions make it nearly impossible. The sub-grade should be well tamped or rolled; tile and gravel drains connecting to sewers or other outlets should be used when necessary to improve drainage.

Ties.—Ties should be of good, sound timber, untreated if completely incased in concrete, spaced on 3 feet centers, using a "brace-tie plate" on every third tie. This will do away with the use of the tie rod which is objectionable where brick or stone paving is used.

Concrete.—Concrete should be made of 1 part of best quality Portland cement, 4 parts of clean, sharp sand, and 7 parts of clean gravel or crushed stone, and should be allowed to set at least 7 days. If, on account of operating conditions, it is necessary to use the track sooner, and this condition is frequently met with, see that the track is solidly blocked up and double the proportion of cement. *Don't* hurry operation over fresh concrete if it can be avoided. Many a track has been ruined by too early use. The concrete should not be less than 6 inches in depth under the ties, and should extend around and above the ties, completely incasing them and the base of rail. Carry the concrete as high as the paving brick or block will permit, leaving ½ to ¾ of an inch for cushion. A 2-inch cushion, commonly used, is unnecessary, and the space had better be occupied by concrete. Put the concrete in place as wet as it can be handled without losing the cement by washing away. It will flush better around the ties and rail and will produce the best results. Tamping concrete under the ties and rail is an uncertain problem depending too much on the human element.

Rails.—Rails should be 60 feet in length; these cost $2 more per ton than the 30 feet lengths, but this is offset by the saving in number of joints and bonds. Even if the difference in price was much greater, the immense advantage of elimination of one-half the joints and bonds, which spell trouble with a big T, fully warrants the increased cost of the 60 feet rail over the 30 feet.

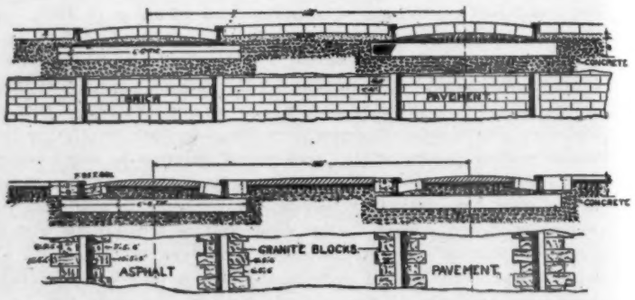
The weight of rail should be governed by the traffic, and it is important to consider the team traffic as well as the car operation and weights. Heavy trucking will affect the condition of the rail to a great extent, and a heavier rail is necessary in streets where the team traffic is considerable than in a street where the car service and weights are the same, but where there is little teaming. Of course, it is very difficult to determine what the future car operation or team travel may be in many cases, but as a general proposition, the experienced manager can judge what the travel is likely to be for many years to come. For residential streets, or other streets where light travel can be reasonably expected, a 70-pound, 7-inch "Tee" rail is suitable. In streets where travel of all classes is heavy, or likely to be in a short time, the 80-pound, 7-inch "Tee" rail should be used. Where extreme conditions of car and team traffic prevail, as in the business centers of large cities, it would be advisable to use a 95-pound, 7-inch "Tee" rail.

Joints and Bonds.—This is the vital part of the track, and it must be remembered that the life of the rail is governed by the life of the joint. Likewise, the condition of the joint is responsible to a great extent for the condition of the bond. It is extremely difficult to maintain any kind of a bond at a loose joint. The angle bar is not much better than the ancient fish-plate, and in every case a "continuous" joint should be used in preference to the angle bar, which is so much in evidence on bad joints. There are several types of soldered and compressed terminal bonds which may be used with good results, though local conditions must be considered in connection with the selection of bonds. Conditions of soil and climate have rendered the use of soldered bonds impracticable in a few instances. A concealed bond applied to the web of the rail, under the joint plate, gives general satisfaction, and is not easily stolen.

Special Work.—For any kind of traffic the "hardened center" work, which is made by several reliable concerns, is the best and most economical in the end. "Built-up" or "home-made" special work is only temporary construction at the best.

Bolts and Spikes.—One-inch bolts of the best quality, and spikes ⅞ by 5 inches, also of good material, should be used with all weights of rail recommended.

Paving.—A good, vitrified brick or paving block makes a most satisfactory form of pavement, especially in the south and southwestern country. If asphalt or bitulithic pavement is used, do not under any circumstances permit the asphalt or bitulithic to be laid against the rail. Use a brick or stone liner against the rail. This will not only permit the tightening of a joint-bolt or the renewal of a bond without disturbing the adjoining pavement, but will also make a more durable job. The use of the special or "nosed" brick is unnecessary and rather unsatisfactory. The regular brick laid as shown in the cross-section of "Tee" rail construction will give far better results.



This construction has been used with great success in Milwaukee and other cities. A rich cement grout makes the most satisfactory filler for brick or stone pavement.

Cost.—The cost of track with this form of construction, the paving requirements being 8 feet in width, will run from $5.25 to $6.75 per lineal foot of single track, varying with the cost of materials, weight rail, wages and character of labor, and local conditions on each job.

There are a few cities having a good sandy soil, where excellent results have been obtained in brick paved streets without the use of concrete foundation. This is very satisfactory in residential streets, but is not advisable in the important business thoroughfares.

Discussion.

The paper was discussed by Mr. Cooper, of Galveston; Mr. Ladd, of Fort Worth; Mr. Kellogg, of El Paso; Mr. Edgar, of Fort Worth, and Mr. Brown, of San Antonio.

The Secretary then read a telegram from Mr. C. B. Roulett, of Dallas, expressing his regret at being unable to attend the convention.

On motion of the Secretary a committee of three was ordered appointed by the Chair to express the thanks of the Association for the courtesies extended to the organization while in El Paso.

In closing the discussion on the paper on "Track Construction," a motion by Mr. Cooper that the Chair appoint a committee, to consist of whatever number he saw fit, to take up the matter of standardization of the high Tee-rail, and frame a communication to be presented to the National organization at its meeting in October, in regard to the desirability of having a standard high Tee-rail, was adopted.

the Chair then announced the appointment of the following committees:

APPOINTING THREE COMMITTEES.

Nominating Committee.—Messrs. Fred. M. Lege, Frank Duffy, Thos. Cook, Samuel Kahn, W. B. Head.

Committee on President's Address.—Messrs. C. W. Kellogg, J. A. Myler, E. L. Wells, A. E. Judge, W. F. Altfather.

Committee on Thanks.—Messrs. H. M. Moore, J. B. Conant, Wm. Chaffin.

The President introduced Mr. J. A. Myler, Jr., who read his paper on

THE PROVING AND TESTING OF GAS METERS.

Gas meters are not an evolution; they were invented to fill a definite place. The meters in use to-day are the same instruments as first produced, with but very slight changes in construction, none, however, in the basic principles, and everywhere gas is known the same type of meter is used.

It seems strange that an instrument, which is so well regarded amongst scientific men and those who understand it, should be so villified and abused by some consumers. And this, in the face of the fact that, in every case where the records of a meter have been used as evidence in law, it has been unqualifiedly upheld. One reason, however, which occurs to me is that, with regular meters (called so to distinguish them from prepayment or slot meters), it is impossible to exercise any control over the amount of gas used, and few consumers will take the trouble to learn how to read a meter so that they can determine where the gas is going.

Without a proper and accurate means of measurement it is certain

that the advantages and conveniences of gas would not now be so distributed. From the time Mr. Wm. Murdock began to give his attention to the gas business, about 1790, before which, although gas had been known, nothing had been done to make the product a commercial possibly, the want of a proper instrument for measuring gas was felt. Not until the year 1814, however, was any very determined attempt made to use gas to any extent. In this year the allied powers met in London to celebrate the overthrow of Napoleon, and many, for the first time, saw gas in use in St. James Park. They, upon re-returning to their own countries, spoke so highly of the magnificent light produced, started a boom in the business, which has endured to this day. Still the meter had not arrived, and great trouble and hardship were caused, sometimes to the companies, sometimes to the consumers. Working on a flat rate for burners, the price necessarily was high and unsatisfactory, preventing the extension of the industry. The flat rate, then as now, afforded the means of so much fraud that the companies were obliged to leave an ample margin to cover the contingencies of dishonest and careless use. Therefore, I say the meter is not an evolution. You all know that gas could never have been sold at the prices which rule to-day unless each consumer paid for the amount used.

The introduction and use of meters, of course, made necessary the introduction of means of testing and proving their accuracy. This was a comparatively simple matter, though, and quickly followed, and, as time and experience demanded, methods were elaborated and improved until now we can feel sure that, if the proper tests are made, our meters are registering the actual amount passing through them. Gas meters, however, are not perpetual motion machines and do get out of order, usually in a great disadvantage and loss to the company.

Meters are proved, as are other measuring devices, by passing through them a known volume of gas or air, and comparing the registration of the index of the meter with the known volume passed through the meter. The unit of measure is a cubic foot, or the volume of 6.2231 pounds of distilled water at the temperature of 62° F. and 30 inches barometric pressure.

A meter prover consists of a tank, the capacity of which has been accurately determined and marked upon a scale secured to the tank. This tank works up and down in another tank filled with water, the water acting as a seal to prevent escape or leakage. It is equipped with inlet and outlet pipes and valves and suitable counterbalance weights to maintain the weight of the holder constant, regardless of how much or how little the holder tank is immersed in the water, thus insuring a constant pressure on the air or gas contained in the holder.

Before going further into the rules and methods to be used, I would like to say that the smaller companies who erroneously feel that they cannot afford to purchase a prover are making a mistake. It would prove one of the best investment ever made. The proving and testing of meters can, and should, be considered under two heads, as follows:

Proving is the proper adjustment of meters in order to secure for them a correct registration.

Testing covers all classes of tests which should be made on meters brought in from service, both of which are fully covered in the rules which follow:

Meters to be Tested.—1. New meters should be tested as needed, keeping about 2 weeks' supply tested up; this also refers to repaired meters.

2. Service meters should be tested immediately after removal.

3. Meters in stock over 30 days since testing should be re-tested before setting.

4. No meter is to remain in service more than 3 years without being tested; 60-light and larger to be changed and tested annually.

Testing.—All meters brought in from service are to be subjected to two secondary tests, after the regular test for accuracy of registration; provided, latter test shows that error is over 4 per cent.

1. The first test is the regular one on the prover. When tests are made with the cover on the meter, they should be for not less than 2 revolutions of the test hand; when the cover is off, satisfactory tests can be made on 1 revolution of the test hand by stopping the meter with the tangent arm in exactly the same position as at start of test.

Meters not over 2 per cent. fast or 2 per cent. slow, shall be considered correct, if the secondary tests, 2 and 3, give no indication of internal derangement.

2. Test each meter with gas, to see that it registers on very small consumption, using a flame not larger than a dime. This is for the purpose of detecting the existence of holes in the diaphragm, or a leak past the valves.

No note should be taken of the accuracy of the meter in this test, but just see that the test hand moves for at least one complete revolution of the tangent arm. Control flame by cock on meter outlet. The test should be continued until the proving or small hand of the meter shows the following motion:

3-light,	$\frac{1}{8}$	of circumference of proving hand.		
5-light,	$\frac{1}{8}$	"	"	"
10-light,	$\frac{1}{16}$	"	"	"
20-light,	$\frac{1}{16}$	"	"	"
30-light,	$\frac{1}{16}$	"	"	"
40-light,	$\frac{1}{16}$	"	"	"
45-light,	$\frac{1}{16}$	"	"	"
60-light,	$\frac{1}{16}$	"	"	"
100-light,	$\frac{1}{16}$	"	"	"
150-light,	$\frac{1}{8}$	"	"	"
200-light,	$\frac{1}{8}$	"	"	"
300-light,	$\frac{1}{8}$	"	"	"

These fractions give in each case at least 1 revolution of the tangent arm.

3. Then the test for sticking or irregularity of flow, by turning gas on stronger until the flame shows small horns. The best way to make this test is to have burners enough connected up to work the meter to its capacity; but a single jet will usually suffice to show any internal stiffness.

Local Adjusting.—Meters with errors of more than 2 per cent. fast or 2 per cent. slow, but not over 4 per cent. wrong (unless from the maker or repair shop when seen below), should be locally adjusted, provided the secondary tests 2 and 3 indicate that they are otherwise in good order.

In making these local adjustments, the meter should be made to register as nearly correct as practicable, and not simply brought within the ordinary limits of 2 per cent. fast and 2 per cent. slow.

Meters received from the makers or from the repair shop with errors exceeding 4 per cent. to be subjected to the secondary test 2 and 3, and if they seem all right, may be locally adjusted for an error not exceeding 6 per cent. If the error does not exceed 4 per cent. they may be readjusted without the secondary tests. When new meters and meters from the repair shop test incorrect, beyond the limits of 2 per cent. fast and 2 per cent. slow, as given above, a report should be sent to the office, giving the date of receipt, the maker's numbers of these meters, and the total number of meters in the shipment, with a request for instructions.

Meters to be tested should be allowed to remain in the room with the meter prover for at least 2 hours previous to proving, so as to come to the temperature of the room. For the same reason, always pass a few feet of the air or gas through the meter before beginning the regular test. See that the temperature of the water in the prover is the same as that of the air in the room, and keep it so during the operation of the testing. A separate thermometer should be used for taking the temperature of the water in the prover, as the evaporation of the water dripping from the wet thermometer will depress the mercury several degrees below the true temperature of the air. Convenient arrangements should be made for changing the temperature of the water, and care should be taken that the rules in relation to temperature are strictly observed. A variation of 5° makes about 1 per cent. variation in the registration of the meter.

In making a test, first make sure that the connections to the prover are perfectly tight, then allow a cubic foot or more of air to pass through the meter, stopping with the pointer of the test dial exactly at a division point; then carefully adjust the pointer on holder to zero; turn on the air or gas to the meter, and make one or more complete revolutions of the pointer on dial, stopping precisely at the point started from. The error corresponding to the reading of the prover scale can then be taken from the table. This table accompanies and is a part of this paper. It should be glued to a piece of cardboard, framed and hung near the prover for ready reference.

A meter test card should be tied to every meter as soon as it comes into the shop, the date and index being entered on the card, with a check mark in the proper place to show whether the meter is a new one, a repaired one, or one just removed from use. A form for this card also accompanies this paper. This card should stay on the meter until the latter leaves the shop, either to be set or to go to the repair shop. When the meter thus leaves, the date should be entered in the

proper place and the card turned into the office. Each test should be dated, and all tests (except those made during the course of adjustment) should be recorded on the card, including tests of new and repaired meters, and the test made necessary before setting, on account of the meter being in stock over 30 days since previous test. When the meter is readjusted the date of the adjustment should be entered in the place provided. Check marks should be made in the proper places, to show where meters leak, do not register, etc.

This slip will show at a glance whether the meters are being tested promptly when received; whether they are retested before setting, in cases where they have been in stock over 30 days since previous test; whether the meters with errors inside of 4 per cent. are readjusted before setting, whether meters with errors of more than 4 per cent. are sent to the shop; whether temperatures of air and water are being kept together, and as one of these cards is turned in for every "set card," it forms a handy check in case the "set card" should be mislaid.

It is important that all consumers' meters not in use should be carefully capped so as to make them airtight. The object of this is to prevent the drying out of the diaphragms, due to evaporation. These caps should remain on when the meters are shipped to the repair shop. Every consumer's meter when set should be carefully supported in position by a bracket or shelf, and should in no case be allowed to hang on the connections.

Meters should be badged at once when purchased, and their identity established by recording them in the meter record. All meters should be badged before the voucher is approved, and the company's number should be entered upon the vouchers before it is returned.

Percentage of Error Table.

Meter Registering 4 Feet.		Meter Registering 4 Feet.		Meter Registering 5 Feet.		Meter Registering 5 Feet.	
Reading of Scale on Prover.	Amount of Error.	Reading of Scale on Prover.	Amount of Error.	Reading of Scale on Prover.	Amount of Error.	Reading of Scale on Prover.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
3.60	x11.11	.17	* 4.08	4.50	x11.11	.07	* 1.38
.61	x10.81	.18	* 4.31	.51	x10.86	.08	* 1.57
.62	x10.50	.19	* 4.54	.52	x10.62	.09	* 1.77
.63	x10.20	.20	* 4.76	.53	x10.38	5.10	* 1.96
.64	x 9.89	4.21	* 4.99	.54	x10.13	.11	* 2.15
.65	x 9.59	.22	* 5.21	.55	x 9.89	.12	* 2.34
.66	x 9.29	.23	* 5.44	.56	x 9.65	.13	* 2.53
.67	x 9.00	.24	* 5.66	.57	x 9.41	.14	* 2.72
.68	x 8.70	.25	* 5.88	.58	x 9.17	.15	* 2.91
.69	x 8.41	.26	* 6.10	.59	x 8.93	.16	* 3.10
3.70	x 8.11	.27	* 6.32	4.60	x 8.70	.17	* 3.29
.71	x 7.82	.28	* 6.54	.61	x 8.46	.18	* 3.47
.72	x 7.53	.29	* 6.76	.62	x 8.22	.19	* 3.66
.73	x 7.24	4.30	* 6.98	.63	x 7.99	5.20	* 3.85
.74	x 6.95	.31	* 7.20	.64	x 7.76	.21	* 4.03
.75	x 6.67	.32	* 7.41	.65	x 7.53	.22	* 4.21
.76	x 6.38	.33	* 7.62	.66	x 7.30	.23	* 4.40
.77	x 6.10	.34	* 7.83	.67	x 7.07	.24	* 4.58
.78	x 5.82	.35	* 8.04	.68	x 6.84	.25	* 4.76
.79	x 5.54	.36	* 8.26	.69	x 6.61	.26	* 4.94
3.80	x 5.26	.37	* 8.47	4.70	x 6.38	.27	* 5.12
.81	x 4.99	.38	* 8.68	.71	x 6.16	.28	* 5.30
.82	x 4.71	.39	* 8.89	.72	x 5.93	.29	* 5.48
.83	x 4.44	4.40	* 9.09	.73	x 5.71	5.30	* 5.66
.84	x 4.17			.74	x 5.49	.31	* 5.84
.85	x 3.90			.75	x 5.26	.32	* 6.02
.86	x 3.62			.76	x 5.04	.33	* 6.19
.87	x 3.36			.77	x 4.82	.34	* 6.37
.88	x 3.09			.78	x 4.60	.35	* 6.54
.89	x 2.82			.79	x 4.38	.36	* 6.72
3.90	x 2.56			4.80	x 4.17	.37	* 6.89
.91	x 2.30			.81	x 3.95	.38	* 7.06
.92	x 2.04			.82	x 3.73	.39	* 7.24
.93	x 1.78			.83	x 3.52	5.40	* 7.41
.94	x 1.52			.84	x 3.31	.41	* 7.58
.95	x 1.26			.85	x 3.09	.42	* 7.75
.96	x 1.01			.86	x 2.88	.43	* 7.92
.97	x .75			.87	x 2.67	.44	* 8.09
.98	x .50			88	x 2.46	.45	* 8.26
.99	x .25			.89	x 2.25	.46	* 8.42
4.00	Nil.			4.90	x 2.04	.47	* 8.59
.01	* .25			.91	x 1.83	.48	* 8.76
.02	* .50			.92	x 1.65	.49	* 8.93
.03	* .74			.93	x 1.42	5.50	* 9.09
.04	* .99			.94	x 1.21	.51	* 9.26
.05	* 1.23			.95	x 1.01	.52	* 9.42
.06	* 1.48			.96	x 0.81	.53	* 9.59
.07	* 1.72			.97	x 0.60	.54	* 9.75
.08	* 1.96			.98	x 0.40	.55	* 9.91
.09	* 2.20			.99	x 0.20	.56	*10.07
4.10	* 2.44			5.00	Nil.	.57	*10.23
.11	* 2.67			.01	* 0.20	.58	*10.39
.12	* 2.91			.02	* 0.40	.59	*10.55
.13	* 3.14			.03	* 0.60	5.60	*10.71
.14	* 3.38			.04	* 0.79	.61	*10.87
.15	* 3.61			.05	* 0.99	.62	*11.03
.16	* 3.85			.06	* 1.19	.63	*11.19

How to Use the Table and Figure Percentage of Error. X *Signifies Fast.* * *Signifies Slow.*

If the scale on prover shows that 2.05 cubic feet have been used in the test. the meter is .05 ÷ 2.05 = .0244, or 2.44 per cent. slow.

If the scale or prover shows that only 1.95 cubic feet have been used in the test, or, in other words that 1.95 cubic feet have been required to make the meter register 2 cubic feet, then the meter is .05 ÷ 1.95 = .0253, or 2.53 per cent. fast.

CO.'S No._____ Date Received_____ 190____

New_____ From Shop_____ From use_____ Index Set_____

Size_____ lt. Maker_____ Maker's No._____

METER TEST

Date of Test.	Checked	Open	Cubic feet passed according to Meter.	Cubic feet passed according to Prover	Error. % fast	Error. % Slow	Temperature. Air	Temperature. Water	Tested By
Secondary Tests	Jerky_____ Non-register on small flame_____								

Non-register_____ Won't pass gas_____ Valves to be set_____

Date adjusted_____ Valves set_____ By_____

DATE SET_____ SENT TO SHOP_____

In the case of a condemned meter, or one otherwise destroyed, the gas company's number should never be used again for another meter. It needs no argument to show that the identification of the meters cannot properly be established and maintained unless each number applies to one meter only.

In shipping meters to the repair shop, a list should be sent, made out on the proper blank, giving a description of each meter, with the reason for sending and the reading of the index.

In conclusion, I would like to call particular attention to the importance and necessity for the immediate protection of a meter removed from service by having corks or caps on the tube screws. The object of this is to maintain the natural condition of the meter from any influence of the outside air conditions; the closing of the tubes prevents any change of air through the meter after removal from service. The air on coming into the meter after the meter has been in use will cause a very great change in its actual recording in respect to correct registration.

The valves may have a certain amount of condensation in them, which, as long as the gas remains in the meter, will not affect the meter; but if the atmosphere should strike this condensation it will very often produce a chemical change, causing the condensation to harden, thereby causing the valves to drag, which results make a very material change in the proving and registering of the meter. Often the diaphragm and valves contain by-products of the gas that has been passing through the meter. As long as this gas remains in the meter the diaphragm will probably be in good shape, be flexible and hold a fairly accurate register with respect to the original capacity at the time the meter was proved. The atmosphere striking this leather on diaphragm will very often have as similar an effect as the atmosphere has on the condition of the valves, only in a slightly different manner. It is quite often found that the diaphragm, after having been in service, is thoroughly saturated with the light volatile oils deposited by the gas, but the minute the atmosphere strikes this diaphragm the oil will disappear, and in a very short time the leather will dry up, and, in a great many cases, harden and become stiff, which condition, as you can easily recognize, will very largely affect the proving of the meter.

Discussion.

At the suggestion of the President the discussion was participated in by the electric men as well as those representing the gas companies. The discussion covered the ground thoroughly, and many exchanges of experience in regard to meters, their care and attention, and the best way to number and record them, were given. It was participated in by Messrs. Moore, Judge, Myler, Cooper, Conant, Davis, Duffy, Stichter and Prof. Scott.

Amendments to the Constitution.

The Secretary stated that at the Executive Committee meeting of March 4, 1908, resolution was passed recommending to the Association that, in Article 7, paragraph 2, of the by-laws, the words: "Two of whom shall be elected by the Association at each annual meeting to serve 2 years, and two of whom shall retire each year, provided, however, that as to the four active members elected for the year 1905, two of said members shall be elected for 1 year and two for 2 years," be stricken out. On motion of Mr. H. M. Moore, the by-laws were so amended. Adjourned to 2:30 P.M.

(To be Continued.)

Some General Notes on Artificial Illumination [1]

By Norton H. Humphrys, F.C.S.

It has been my practice for the last 25 years or more to take a stroll once or twice a year round the principal streets and districts in the west end of London after dark, under the impression that some of the best examples of the latest applications of artificial lighting may be seen there, and to make observations from the point of view that might be expected to be held by a lighting or illuminating engineer. Such an individual may be supposed to look for a maximum of efficiency at a minimum of cost. He would wish to avoid waste in every form on the one hand, and to secure a satisfactory degree of efficiency on the other. In the course of the period above named there has been, according to the opinion of the man in the street, a great "improvement." He will tell you that the shops and the streets are "better" lit than they used to be, which simply means that there are more light centers and higher candle power, but not necessarily that there is any advance from my point of view. I say that the lighting is worse, in the sense that there is more waste, more unequal diffusion, and less consideration for the few elementary principles that we know to be necessary for efficient lighting. In my notes I refer to the light center or source as "the light," and to the objects to be lighted as "the object," and it will be convenient to retain these terms. We must also remember, in connection with this subject, the primary purpose for which the light is provided. A street lamp is intended to act as a guide and a help to passengers, a lamp in a shop window to show off goods, and so on.

We are not at present interested in the description of light, but only with its candle power. It may be electric, arc or glow, gas, incandescent or open flame, petroleum, or any medium in actual use. But we must avoid the mistake of figuring upon candle power as being equivalent to money value. The actual cost, even with the same medium, does not vary *pro rata*. For various reasons that do not now concern us, the cost of a 200-candle power light is not necessarily twice that of a 100-candle power. Nor has the practical value or benefit derived by the user anything more than a very indirect connection with candle power. It is affected by the color, the shape, the area, and the diffusive power, and especially by the extent of the spherical area covered by the light. The burner and the branch or other support must necessarily block out a part of the lighting effect, and the extent and position of the part so stopped will exercise an important effect on the value of the light. A light is also considerably influenced by the nature, and especially by the color, of its surroundings. In the case of a light of equal candle power, very different effects are produced (1) when it is placed in a window stocked with white goods; (2) amidst a pile of black goods; (3) surrounded by brilliantly polished articles, such as jewelry, etc.

In primitive days, from an illuminating standpoint, there was no idea of anything like a broad, general effect, but the candle was placed as closely as circumstances would permit to the work or the object. The remainder of the compartment might be in comparative darkness. Even in a shop the lights were confined to the counter. This kind of lighting is now replaced by a more or less equable lighting of the whole area of the room, building, or street; but it is remarkable how deeply rooted old ideas and customs seem to be, and how they retain a hold long after the cause which originated them has disappeared. Even in modern designs there is a tendency to retain the candle holder or the oil reservoir in the pattern, and the same appears to be the case with regard to the custom of placing the candle or the lamp close at one's elbow. So long as we are only dealing with lights of less than 10-candle power there is no objection to placing the light close to the object, but when we use lights that are valued in hundreds or even thousands of candle power several new conditions come in.

Probably the first impression that strikes the thoughtful observer is the waste of light, as represented by powerful lights hanging so low as almost to swing in one's face, or placed within a yard of the object. It seems hackneyed to say that the eye should rest upon the object and not on the light; but in practice the lights seem to push forward into the front place. They are located obtrusively on the fronts of buildings, in front of the object, and in other positions where they are bound to be looked at, and where they exercise no useful effect. Why a tradesman should imagine that the public will have a better opinion of his wares or resort more frequently to his establishment because he strains their eyesight and offends their innate sense of the fitness of things by the extravagant and senseless use of light, is not very obvious. Yet there appears to be a widespread impression that moths are not the only things that are attracted by a dazzling light.

There are other considerations even more important than the waste of light and of money. I am glad to see that some attention is being directed to the relation of artificial light to the human eyesight. Many people are engaged for half their working time or more, under artificial conditions of lighting, and all are concerned in the matter to an important degree. The way in which 1,000 to 2,000-candle power lights are used, to say the least, displays very great confidence in the power of the eye to adjust itself to very wide variations. But the eye must be subject to limitations, just like the other senses. The ear, for example, can recognize only a limited number of octaves, as regards sound, and the eye also has its high and its low limit, with no sharp line of demarcation. Suppose we are seeking to note the details of a large poster or the details of a building by the aid of a variable light, such as that afforded by one carried on a motor car and approaching at a slow rate. At first the light is at such a distance that we cannot see anything. As it approaches nearer and nearer, the details sought for become gradually more and more distinct, until at last there is sufficient light to render the observation easy and comfortable. Assuming the intensity of the light to continue increasing beyond this point, a stage is reached when, to use the common expression, it becomes dazzling or blinding.

And if we allow our investigations of the public lighting to extend over some hours, we find by unpleasant experience that a long continued, glaring light is not beneficial to the eyesight. The power of the eye to adjust itself to the lighting surroundings covers considerable limits, between the point when we say that it is too dark to see, and that the light is too bright. But is it safe to assume that any dangerous or prejudicial overtaxing of this power will at once be evidenced by fatigue or other physical discomfort? It does not seem unreasonable to assume that continued or frequent contact with unnecessarily high power lights must tend to weaken or depress the powers of vision. The importance of this is evident when we remember that the majority of workers depend upon eyesight as an indispensable assistant to their daily work, and would be helpless without it,

A rule that was accepted and followed in practice for many years was that a safe, sufficient and comfortable illumination is afforded by the candle foot, a light equivalent to that afforded by one standard candle placed at a distance of one foot from the object. The value of this degree of light can be shown on an ordinary photometer, which can readily be made to show one, two or more candle feet upon the screen. One or two candle feet power does not strain or fatigue the eye, but when we get up to 10 or more candle feet the eye is fatigued. Following the rule of the candle foot I have, in the course of several years, carried out several installations of lighting that were accepted and pronounced satisfactory. According to the laws of inverse squares, the distance between the light and object to secure the candle foot should be as follows:

Candle Power.	Feet.	Candle Power.	Feet.
2,000	45	100	10
1,000	31½	80	9
500	22	50	7
300	17	40	6
200	14	30	5½
150	12	20	4½

Before proceeding to notice conclusions that this table naturally suggests, it will be desirable to glance at one or two other details. The question of angle with the line of sight is quite as important, if not more so, than that of distance. The line of sight is a straight line drawn from the eye of the observer to the object, and obviously may cover any point of the circle or sphere to which the eye can be directed. While walking or sitting in a natural position the line of sight tends to keep in the vicinity of a horizontal direction, and the horizontal may be called the natural line of sight. If we consider daylight, of the actual reality of which the illuminating engineer can produce but a more or less imperfect imitation, we find that the lighting angle is large. The protection afforded by the projecting eyebrow is an indication of the fact that the lighting angle should be not far short of 90°. But our practical observations carry the impression that the question of lighting angle is neglected as much as that of distance, and frequently it is much to small.

As a matter of general experience and difficulty of adopting the powers of vision to suit either a dazzling or a dim light is greatly in-

[1] The *Illuminating Engineer*, London, England.

creased if there is also a small lighting angle. So far we have been considering properties inherent to the light itself, but the object and its surroundings have an important effect. We have to consider the effects of color and of reflecting power, and this is especially important as regards the antipodes, the opposite sides of the light. We sit at a table to write or to read with a light, say, 4 feet above, and provided with no downward reflector. Under these circumstances the lighting effect will be influenced by the character of the ceiling, whether the usual white plaster or wood of various kinds. The color of the walls and furniture also figure in the matter, but not to such an extent as the ceiling. In the street, note the different effect of the street lamps; (*a*) in the vicinity of a clean white stone building, and (*b*) where there are trees or open space behind them. If we can find white goods shop, a jeweller's, and a boot shop, each lighted by an equal or nearly equal candle power, we can notice the different effect in each case.

But it would appear that, as a rule, the lighting arrangments are decided in a haphazard sort of way, without any reference to the three important considerations—distance, angle and environment—as above noticed. There is a story told of a nigger who went into a shop and ordered a pair of boots. When asked to allow the measure of his foot to be taken, he replied to the effect that he did not trouble about that, but would like them as large as possible for the price. Many things are purchased, however, on identical lines, light amongst the number. The power, position and number of the lights are oftener a matter of mere selection from designs in an illustrated list than of a competent estimate or scheme for producing a predetermined effect.

The power of each light center should be limited according to the height of the room or apartment as determining the distance between the light and the object; and in rooms with white ceilings a satisfactory result is usnally produced when they are situated at about two-thirds of the distance between the floor and the ceiling. To give an example, in a room 12 feet high, the lights should be 8 or 9 feet from the floor, and should not exceed 40 to 50-candle power. In most cases it will be found that the light must be not more than 10 feet from the object, and, therefore, it is not too much to say that lights of less than 200-candle power are sufficient for all ordinary purposes, and, indeed, for anything short of what is known in America as mast-lighting. But I would suggest that the limitations as to the distance, the angle and the surroundings are affected by the candle power, and that in regard to any particular degree, whether 50, 100, 200 or 500-candle, there are special conditions suited to each.

A consideration of the distance table above quoted seems to show that there is a tendency towards lights of higher power than are actually necessary, and this leads up to the question of the most appropriate size for the light unit. Until within comparatively recent times this was almost a matter of Hobson's choice. It was not a question of what size was wanted, but of what size could be had. For some reason or other not connected in any way with illumination, the 5-candle feet per hour gas burner acquired a leading position, and at one time represented more than half of the total consumption of gas. The same thing occurred with the 16-candle power, electric glow-lamp. But it is now possible to get a range of almost anything between 5 and 200 candles, so there is no longer any excuse for a slavish imitation or preference for any one special size. An important feature to be considered is the area occupied by the light. In theory we assume the light to emanate from one point, but in practice the light always has an appreciable area. All other things being equal it is preferable that the area should be large. Given an equal photometrical value, a light of, say, 4 square inches in area is preferable to one the size of a pea. The smaller area gives sharp shadows and a greater intensity per unit of area. Shadows are always objectionable, and the object of skilful lighting is to neutralize them, or, at any rate, to tone them down. The larger the light area the less sharp will be the shadows, and, therefore, the less noticeable. And since the eye objects to violent contrasts, the lower the intensity the more satisfactory the effect. This is the reason why translucent or "opal" globes are preferred for lights of small area but high intensity. In place of a dazzling point of light, we get a luminous globe of several inches in diameter. There is a large loss of photometrical value, perhaps two-thirds. But the light is pronounced to be better than before.

We can considerably alter the effect of objectionable features by the judicious use of globes, shades, or reflectors. By the term "globe" we may understand an arrangement that entirely incloses, and possibly conceals, the true shape of the light center. A "shade" is usually placed above the light, to deflect a portion that would otherwise be wasted on the ceiling or upper part of the room into a useful direction. A reflector is an opaque shade that need not necessarily be above the light. We can find plenty of examples of globes and shades. A white opal shade above the light is very generally used; but, as is the case with the other fittings, the shape appears to be a matter of fanciful selection rather than of predetermined effect. Some recent researches seem to show that the angle of the shade, as compared with the line of vision, might well be a matter of careful investigation and experiment. The same applies to reflectors, the most familiar examples of which are the cardboard shades placed over billiard lights or the desks in a bank or counting house. One of the most interesting examples of reflectors is the footlights at a theater, where they not only direct the light to the object, but conceal the light center. It is by following these lines that the best lighting effects are produced. The concealment of the light is only practicable in particular cases, but much can be done in this direction by keeping the light as far as possible out of the prevalent lines of vision, and by the use of globes and reflectors.

Is Electric Light Injurious to the Eyes?

In "The Illuminating Engineer" for the current month one of the leading editorial articles is directed to a discussion on the topic named in the heading. It is noted that:

The relation of artificial illumination to the increase in defective vision is a matter which is attracting more and more attention, especially on the part of those responsible for the lighting of schools. The school naturally affords a ready opportunity for the testing of eyes for visual defects, which accounts for the particular interest in the subject in connection with school children. Could similar tests be made in adults, taken at random, the proportion of defective eyes would doubtless be found to be even larger than with the children.

In seeking the cause of this really serious condition there has been a considerable tendency manifested to place the blame upon the electric light. The reasoning seems to be something like this: Defective eyes are much more common now than a couple of generations ago, especially in the larger cities; a couple of generations ago children did not have the electric light; therefore the electric light is responsible for defective vision. The argument is plausible, but the conclusion is subject to doubt; it may be only a case of coincidence. "Bob" Ingersoll once pointed out the fallacy of mistaking coincidence for cause by the following example: "Plug hats and suspenders are always found where the greatest enlightenment is prevalent, but it would be unsafe to conclude that plug hats and suspenders are the causes of the enlightenment."

In a paper read before the New York Section of the Illuminating Engineering Society, Dr. H. H. Seabrook was particularly outspoken in his indictment against the electric lamp, the chief count being the comparatively large amount of violet and ultra-rays which it gives out. He says:

"Spectral rays of sufficient intensity cause damage, but the blue, and still more the violet rays, are the really harmful ones. Our country leads the world in the brilliancy of its artificial illumination, and certainly leads the world in ocular exhaustion, discomfort and congestion. When gas came into general use these troubles began to increase, and a further increase was in evidence as the incandescent electric lamp came more and more into fashion. Both here and abroad oculists agree that the kerosene burner is the least harmful artificial illuminant. The image of the brilliant filament of the incandescent lamp, with its concentration of light, must harm the retina more than the more diffuse images of flames. * * * In concluding, lights weak in chemical rays are better suited to the eyes than others. * * * Take the spectrum of daylight through a window, and that of kerosene, Argand, Welsbach and incandescent electric lamps from just where you would sit to use them for near work; see what shade of amber yellow glass it takes to cut off the blue and violet rays, and you will find under those conditions the kerosene burner at one end of the list and the incandescent filament at the other."

In other words, the kerosene burner is the best and the incandescent electric lamp the worst for the eyes.

Dr. Louis Bell, who is a doctor of philosophy and not of medicine, but withal very competent to pass opinions upon the physiology of vision, in his discussion of Dr. Seabrook's paper, says:

"It is to be noted that the blue rays have frequently been regarded as unpleasant and harmful. How far that is true with modern in-

tensities, I do not know. There is every reason to believe that ultra violet, unless it is intense, is not particularly dangerous, although it can produce very bad results. Common daylight, everywhere agreed upon as by far the most comfortable light, is enormously richer in proportion of blue and ultra-violet radiation than any artificial light, save that from the quartz mercurial arc, or the Finsen lamp, or possibly the titanum arc; so that a moderate amount of blue rays can hardly be considered injurious."

In a paper on "Eyesight and Artificial Illumination," by Dr. John T. Krall, read before the Philadelphia Section, the conclusions reached are also at variance with those of Dr. Seabrook. After calling attention to the fact that notwithstanding the many and careful experiments that have been carried on to determine the nature of vision, its mystery has not been explained, nor even lessened, Dr. Krall says:

"The red and violet ends of the spectrum are ineffective in vision, and consequently must produce very little photo-chemical change in the retina. The danger of any source of light, therefore, lies not in the peculiarities of radiation, but rather in its excessive brilliancy. * * * Kerosene lamps, candles, etc., never produce over-stimulation, as they possess only a few candle power per square inch against some hundreds in arc and high efficiency incandescent lamps. * * * Many authorities on diseases of the eye would have us go back to the feeble candle or the but slightly better kerosene lamp of our ancestors because of that terrible bugaboo, ultra-violet ray, X-ray, or some other obscure radiation. * * * The electric lamp is the best source of illumination, so far as eyesight is concerned, that is offered at the present time. * * * It is condemned by many writers without just cause because someone considered as authority conceived a dislike for it and advised against its use, and the next man writing upon the subject accepts the authority and passes it along without going to the trouble to find out for himself. * * * The electric lamp, properly used, is a perfectly harmless source of illumination. * * * The burden of proof that electric lighting is harmful to the eyesight rests upon its objectors, and they have not produced the evidence."

The old question, "who is to decide where doctors disagree?" carries with it the important fact that disagreement among doctors is a practice of long standing; but the question itself has never been satisfactorily answered. In the present case, however, such points as the doctors do agree upon may be accepted as true with a reasonable degree of assurance. That excessive brilliancy, either of the illuminated surface or the intrinsic brightness of the light source is harmful to the eyesight, is accepted alike by doctors, oculists and illuminating engineers, and unquestionably constitutes the greatest source of danger in modern illumination.

The whole trouble with the electric lamp arises from the manner in in which it is used, rather than in the lamp itself. A flame produced either by gas or oil may be looked at directly or left in the line of vision with impunity, its intrinsic brilliancy not being sufficientlyhigh to cause any ill effects, as ordinarily used. The filament of the incandescent electric lamp, however, is an entirely different affair and cannot be treated in the same way as a flame source. At least 99 out of every 100 persons confuse brilliancy of the light source with effective illumination, and look at the light instead of the objects which they want to see in attempting to form a judgment of the comparative merits of different systems of lighting. There is no more difficult nor more important work of education confronting illuminating engineers at the present time than that of disabusing the layman of this pernicious idea. So far as the light itself is concerned, as Dr. Krall says, no evidence has been produced, nor is likely to be produced, to prove that the rays from incandescent electric lamps are one whit more dangerous than those from candles or other flame sources. Electric lamps are always inclosed in glass bulbs, and it is a well-known fact that glass absorbs to a very large degree the ultra-violet rays which are considered by some authorities so dangerous. The bare electric lamp, however, for near work, such as reading or writing, is always and everywhere to be condemned. The present tendency of the manufacturers of such lamps to furnish a complete lighting unit, consisting of some form of globe or reflector and a lamp having a bulb wholly or partly frosted so as to diffuse the light, cannot be too highly commended.

The electric lamp is one of the greatest achievements of modern science, and its use will continue to increase for years to come at approximately the remarkable ratio which it has shown in the past decade. There is no likelihood of a return to flame sources, even for the most exacting eye work. But the electric lamp must be understood, and its light utilized in a manner to render it safe and hygienic to the eyes to the highest possible extent. To promote such knowledge and use is the duty alike of manufacturers, illuminating engineers, oculists and the medical profession.

Workmen—Where Can We Find Them?

"The future supply of skilled labor for America's industries depends upon making the proper provision for industrial education. Changing conditions and the labor unions have killed the old apprentice system, and our boys are growing up with less chance of learning a trade than their fathers had. Bavaria, with the population of New York city, has more trade schools than the whole United States."

So says "American Industries." Continuing the theme:

"The little kingdom of Bavaria, with a population not much greater than that of New York city, has 290 trade schools, giving instruction, night and day, in 28 arts and crafts. In this whole country of 85,000,000 people there are fewer trade schools than are in that little German kingdom.

"Two-thirds of the convicts in America's prisons are men without a trade or profession. The superintendent of a penal institution, being asked how many of the prisoners had knowledge of a trade, answered, 'Absolutely none. If they had they would never have come here.'"

These two statements, appearing in recent addresses upon the subject of industrial education in the United States, make a startling commentary upon the progress which a people fond of boasting themselves the most practical in the world have made toward solving a problem which is among the most urgent confronting every industrial country of the world to-day.

The question of what shall be done to provide the industrial education on which depends the future supply of skilled labor necessary to maintain our country's place in the race for industrial supremacy, is one of those vital questions which concerns every American. It concerns the prosperity of employers and workmen alike; but more than that, it concerns the future welfare of the republic. Upon the course taken by those on whose hands rests the decision of the present time will depend whether the American children of the next generation are to have the advantages of the Bavarian child of to-day, or whether they are to be left to the conditions which are filling our prisons with convicts who are criminals because they had no other trade.

In deciding what that course shall be the manufacturers of America, united in such organizations as the National Association of Manufacturers, can exert an influence commensurate with the importance of the question to them. The educators of the country are already aligned in support of the cause of industrial education. It only remains for the employers as a body to add their influence in order to overcome the two great obstacles in the way—the indifference of the mass of the people and the mistaken, but nevertheless bitter, opposition of the labor unions, which fancy they see in the establishment of schools to educate skilled workmen the doom of the closed shop and union domination.

There was never a time when the need of intelligent training in the mechanic arts was so great as to-day. The demands of efficiency and economy have specialized our industries in a way undreamed of a generation back, while at the same time, largely through the mistaken attitude of organized labor, the old apprenticeship system under which the skilled American workman of that generation got his training, has all but disappeared. To fill its place there are only the inadequate beginnings of a system of industrial instruction in public schools and in training departments maintained by certain great industrial corporations.

The extent to which the short-sighted policy of the labor union has barred the door of opportunity to its own children may be seen by these statements made in the last report of the Committee of Industrial Education of the National Association of Manufacturers:

"There are scores of cases where a father is not permitted to teach his own son the trade in which he himself is engaged. And these same limitations and restrictions of labor unions in like manner bar out the sons of journeymen belonging to these unions from learning trades. * * * Incredible as it may seem, it can be conclusively shown that American boys in certain sections of our country are actually committing unlawful acts and misdemeanors in order to be apprehended and convicted, in the hope that they may be punished by

being sent to a reformatory institution where trades are taught, that they may thereby secure an opportunity to learn a trade."

Three-fourths of all the country's working population are wage earners engaged in industries of production and trade. The professions comprise 4 per cent. of the country's workers. Contrast with these proportions the comparison between the number of schools in the United Stetes devoted to instruction in the industrial arts and the number of schools and colleges which fit men for the learned professions.

The volume and variety of our industries far exceed anything seen in any other country, and they are expanding at a tremendous rate. In 1905 the number of wage earners engaged in manufacturing industries was double that so engaged in 1880. Compared with the needs of the country the increase made in the same period in the provision for industrial education has been very small. Our larger cities are at length making more generous provision in the way of technical and manual training schools, and here and there training departments have been established by large industrial concerns. These efforts, valuable as they are, are too few and too haphazard. What is needed, and what can be secured by co-operation between educators, manufacturers and working men, and State and National governments, is a systematized and comprehensive plan under which a manual training department shall be attached to every public primary school in the United States. The training begun here should be supplemented by free industrial high schools which would graduate, at the age when our high school graduates now are just beginning their practical education, skilled mechanics ready to take up their trade.

We need more skilled workmen now than ever before, and we shall need them in still greater numbers and of an increasing standard of efficiency with every passing year, if the United States is not to fall behind in the world's competition of progress. All the industrial nations of Europe are ahead of us in facilities for industrial education. Bavaria is only a type of what is to be found throughout the entire German Empire. The only way in which America can rise to the situation is to give similar industrial training to our rising generations, beginning it at the earliest age at which the child can hold tools and throwing the door of industrial opportunity wide to every one of her sons.

Right at our hand is an opportunity to raise up more and better mechanics than the apprenticeship system, even in its best estate, ever furnished. Let every boy from the age of nine or ten to fourteen, give an hour every school day to the use of tools employed in the more important mechanical trades, under competent instructors.

Thus we will get more and better mechanics than the old apprenticeship system ever gave us. We will have new supplies of skilled workers at home instead of having to look for them among our immigrants and being of our own household they will know our tastes and needs better than aliens.

In Respect of the Federal Coal and Coke Company.

In order that the exact present status of the Federal Coal and Coke Company may be made clear, we print the following, under the authority of Messrs. J. K. Dimmick & Co., of Philadelphia:

The many rumors that have been in circulation recently regarding eastern capitalists negotiating for the purchase of the Federal Coal and Coke Company's property were verified, when, at the annual meeting of the Federal Coal and Coke Company's stockholders, a majority of that Company was elected representing the new interests. The Board as elected comprises the following gentlemen: J. L. Lewis, Fairmont; Edward Page, Philadelphia; Robert Windsor, Boston; C. Minot Weld, Boston; Walter C. Bailies, Boston; Robert Grant, Boston; and Jas. L. Richards, Boston.

Mr. Lewis and Mr. Page were on the old Board of Directors of the Federal Coal and Coke Company. The last five gentlemen are new members of the Board.

Mr. Windsor is Director, and on the Executive Committee, of the Boston Consolidated Gas Company, the Boston Elevated Railway, National Shawmut Bank and some 25 other large corporations of the United States.

Mr. Weld is President of the New England Cotton Yarn Company, a Director, and on the Executive Committee of the various Gas Companies in Boston and vicinity; also of the Edison Light Company, of Boston.

Mr. Bailies is a resident of Boston, is Director, and on the Executive Committee of the Gas Companies in Boston; also Director, and on the Executive Committee, of the Edison Electric Light Company, Boston.

Mr. Grant is Treasurer of the Boston Consolidated Gas Company.

Mr. Richards is President of the Boston Consolidated Gas Company and of the New England Gas and Coke Company; also of the Massachusetts Steamship Company, and 15 other companies.

The newly elected officers of the Federal Coal and Coke Company are as follows:

President—Mr. James L. Richards.
Vice-President—Mr. J. L. Lewis.
Treasurer—Mr. Robert Grant.
Asst. Treasurer—Mr. E. B. Page.
Secretary—Mr. John C. Rice.

It is the intention of the new owners of the Federal Coal and Coke Company to immediately develop the property recently acquired and increase the present output of 1,000 tons per day to about 5,000 tons per day. Contracts have already been made for a large quantity of coal by the Federal Coal and Coke Company and the New England Gas and Coke Company, of Boston, which means a great deal to the mining interests of this country, particularly to this locality, for the reason that all coal shipped by the Federal Coal and Coke Company between the New England Gas and Coke Company is to supplant foreign coal which the New England Gas and Coke Company has in the past and is at the present time using. The New England Gas and Coke Company, averaging to use some 600,000 tons of coal per year, all of which at the present time, and for the last 8 or 10 years, has been bought of the Dominion Coal Company, of Nova Scotia. Corporations in New England with which the people who have recently bought into the Federal Coal and Coke Company are connected are using over 2,000,000 tons of coal per year.

Great credit is due to Mr. J. L. Lewis and Mr. Edward Page in consummating a business transaction of so much importance to this locality.

Items of Interest
FROM VARIOUS LOCALITIES.

"W. H. F.," writing from Salt Lake City, Utah, under date of the 14th inst., says: "Miss Ora Blanchard, of Milwaukee, has been conducting a series of 12 demonstratory lectures on cooking by gas in this city under the auspices of the Utah Gas and Coke Company. As usual the lecturess was quite up to her work, and her audiences were large and enthusiastic."

A VERY curious error in the construction of a gas meter was recently brought to light in Toronto. The firm of Robt. W. King & Co., a reputable and prominent business house in that city, suspected that their gas meter was inaccurate or that someone on their premises was using gas surreptitiously, and that such excessive use of gas had been going on for 2 years or more. Right after complai nt had been made to the Consumers Gas Company, the firm had their shops, from seller to attic, closely watched, with the result that no improper use of gas was detected, and then came the test of the meter, which was made publicly in the offices of the Weights and Measures Department of the Inland Revenue office, by Mr. James Pape, the Government Inspector. Those present at the test were: Mayor Oliver, Comptroller Spence, City Solicitor Chisholm, Ald. J. J. Graham and B. T. McGhie, and A. B. Barry, Engineer-in-charge of the Health Department. Also Mr. W. H. Pearson, General Manager of the Consumers Gas Company, and his Assistant Manager, F. T. Hewitt. The meter on casual inspection seemed sound and normal, but a closer examination revealed the queer fact (the meter was of the 20-light order) that the dial plate was one intended for a meter of the 50-light class. The mistake was traced back to the date on which the meter had been sent out of the shop after repairs (and from whence it had been sent out for resetting, January 20, 1906), and after it had been tested for correctness and certified to by Dr. J. K. Johnstone, then Chief Inspector for the Government.

WE are in receipt of the annual report of the Lamps Department, City of Boston, Mass., for the year 1907, as compiled by the Superintendent of the system, Mr. Dennis J. Kern. And he is to be complimented on its thoroughness, for an examination thereof will readily prove that he who wished to know about the detail of Boston's system of street lighting would not have to go outside the covers of the book. The total number of lamps of all kinds in use in Boston, Jan. 10, 1908, footed up 16,731, of which 10,685 were of the Welsbach mantle type—an increase of 614; Welsbach naphtha, 1,446—a decrease of 345; electric arc, 3,796—a decrease of 12; incandescent electric, 41—an increase of 9; fire alarm, 188—an increase of 9; triple mantle gas, 180—an increase of 5; triple mantle police, 19 - all new; double mantle naphtha, 16—a decrease of 5. The Welsbach ordinaries cost (average $30.31; maximum, $30.44; minimum, $29), but the charges vary in certain districts. The triple mantle boulevard gas lamps of Welsbach type range between the limits of $60.62 to $65.30. The charge for arc electric lamps ranges between 35 cents per arc per night to 30 cents per arc. The rate for incandescent electrics varies between $2.50 and $8 per month each—they are all of 32-candle power. Referring to the wages paid to the lamplighters

Superintendent Kern says: "On July 1, the wages of all persons in the labor service of the city receiving less than $2.25 were increased to that amount, and accordingly the wage of the lamplighter was increased from $2 to $2.25. This increased wage added materially to the cost per lamp per annum. The number of gas lamps cared for by each lighter has been decreased to an average of about 84 lamps per man; but with this increase in wage and change in the number of lamps, I believe that a corresponding increase in efficiency has also taken place. * * * Judging from 2 years' experience in this office and consulting with able men who have had experience in this department, I am of the opinion that, in order to give the citizens the excellent service they are receiving to-day, in any further contracts made by the city the gas lamplighters should not be called upon to care for more than 85 lamps on the average." The amount appropriated for public lighting was $840,000. There are very many other interesting details in the report.

"W. L.," writing to us under date of the 15th inst., says: "The C. H. Geist Company, a gas and electric syndicate, with headquarters in Chicago, has purchased the electric light plants at East Chicago and Indiana Harbor, Ind. These properties were formerly owned and operated by the city of East Chicago. The combination purchase will hereafter be known as the Indiana Harbor and East Chicago Electric Company, officered as follows: President, C. H. Geist; Vice-President, C. H. Week; Secretary and Treasurer, C. W. Fox.

At the annual meeting of the shareholders in the Tri-City Railway and Light Company, the reports submitted by President Porter must have been very satisfactory to the shareholders, in that the figures showed gross earnings for the year amounting to $649,963.60. Interest charges were returned at $398,343.07, so the net income was $251,720.53. A large expenditure was made on reconstruction and extension account, the major sum going into the rehabilitation of the railway system. The new electric plant at Moline, Ills., was practically completed—it has a steam generating capacity of 10,000-horse—and the gas plant also located in Moline, is nearer to date by the construction of a 500,000 cubic foot storage holder, and enlarged scrubbing and purifying capacity. The Rock Island (Ills.) equipments was also overhauled, and the operation of the plant of the gas and electric Company, of Davenport, Ia., was discontinued. President Porter's closing paragraph seems worth reprinting here. He said: "The efforts made during the past year to secure new business have resulted in most satisfactory returns, and we have every reason to believe that by the continuation of an active business-getting campaign the results for the coming year will be more satisfactory. Commerce and industry generally in Rock Island, Davenport and Moline were affected adversely by business conditions in the latter part of 1907, but show evidence of returning, at an early date, to prosperous conditions, and the prospects for additional business in all lines in the future are favorable."

"T. M. D.," having noted our mention of certain baseball teams recruited from the employees of the named Companies, forwards the following respecting the baseball teams of the Baltimore Consolidated Gas and Electric Company: "At the Spring Garden plant of the Consolidated Gas and Electric Company a baseball diamond has been laid out and will be the scene of great athletic activity on the part of the employees of the Company during the summer. The Company has, at large expense, provided and prepared the grounds in an admirable manner, and has furnished the 4 teams that compose the league with uniforms and all the necessary equipment. The teams are representative, respectively, of the Main Office, the Spring Garden, Eutaw and Westport districts of the Company. A regular schedule has been arranged, the contest opening May 2d and closing September 26th."

A CORRESPONDENT forwards the following, under date of the 19th inst.: "The annual meeting of the shareholders in the Denver Gas and Electric Company was held the afternoon of the 12th inst. The annual reports showed a prosperous year, the net earnings exceeding those of the corresponding twelvemonth in the sum of $136,000. The Directors were authorized to create a sinking fund for the retirement of certain bond issues, and arrangements were also made to issue a number of small denomination bonds in place of some of the larger ones now outstanding. The cheapest bond is now $1,000, and it is planned to replace some of these with denominations of $100 to $500, for the benefit of the small investor. No action was taken in regard to the purchase of the Majestic Building. The period closing May 1 shows an increase in gas sales of 112,841,900 cubic feet, a gain of 16.1 per cent. in quantity and 11.8 per cent. in gross receipts. Electric sales show an increase of 4,559,755 kilowatt hours, a gain of 21.7 per cent. in quantity and 14.8 per cent. in gross receipts. The cost of operation increased on account of an advance in prices of coal and other commodities. Additions to property cost the Company $572,560.38. On May 1, 1907, there were 386 stockholders, of whom 81 were residents of Denver. On May 1, 1908, there were 680 stockholders, of whom 295 were residents of Denver. There are 145 employees of the Company who are now stockholders. There has been an increase of 2,249 in the number of gas consumers and of 3,150 in the number using electricity. The Company still has outstanding $458,600 of prior lien 6 per cent. bonds, maturing in 1910; $936,600 of Denver Consolidated Gas Company 6 per cent. bonds, maturing in 1911, and $250,000 or 3-year notes, due in 1910. The changes in the Board of Directors were these: Messrs. Barry Sullivan, Philip Cross and Henry Woods were succeeded by Messrs. John T. Brady, John H. Porter and C. N. Stannard, and the following officers were re-elected: President, H. L. Doherty; Vice-President and General Manager, F. W. Frueauff; Second Vice-President and General Superintendent, C. N. Stannard; Treasurer, John T. Brady."

We regret very much to report that advices to friends at his home in St. Joseph, Mo., from those near to him in Los Angeles, Cal., are to the effect that Mr. Kerr Murray Mitchell is very ill. He visited Los Angeles for relaxation and in the hope that travel would improve his physical condition, which had not been altogether of the best for the last year or so.

At the annual meeting of the Carlisle (Pa.) Gas and Water Company the officers elected were: Board of Managers, F. C. Bosler, J. K. Bosler, L. R. Breneman, R. S. Hays and Wm. Henderson, Jr.; President, John Hays.

The Federal Coal and Coke Company, of Fairmont, W. Va., has been purchased by Massachusetts financial interests that are closely allied with the gas industry of the Bay State. For instance, in support of that contention the newly elected President of the Federal Company is Mr. James L. Richards, the well-poised gentleman who has done so much for the rehabilitation of the gas trade of Boston, in his position as President of the Boston Consolidated Gas Company.

At the annual meeting of the New York Mutual Gas Light Company, Mr. George Zabriskie and Mr. James U. Jarvie were elected to the Board of Directors, vice Mr. James Stillman and Mr. Samuel Sloan. These changes have no significance whatever in respect of a change in the ownership and dominant interest in the Mutual Company.

The Lynn (Mass.) Company will finish the work of piping to and through Nahant Beach a full fortnight in advance of the time originally set for the completion of that work.

Mr. W. A. Knudson, formerly in the service of the Astoria (Wash.) Gas Company, has been selected to take charge of the generating house of the new gas plant at Olympia, Wash.

The New York and Richmond Gas Company, Staten Island, New York, seems to be going right along to and over Success Road, if one may judge from the gross figures submitted, respecting its operations for 1907. From these it is known that the gross earnings were $256,083; operating expenses—including maintenance, taxes and insurance—$158,245; net earnings from operation, $97,808; interest on bonds, $63,460; net, $34,348. Good for Mr. Horton and his men!

The Gas Bench Construction Company, of St. Louis, Mo., will install the new generating capacity for the El Paso Gas and Electric Company, in the shape of 3 new benches of half-depth, rear clinkering sixes.

At the annual meeting of the Petersburg (Va.) Gas Company the officers chosen were those who served in similar capacities last year: President, R. D. Apperson; Vice-President, Judge Horsley; Treasurer and Secretary, F. H. Shelton; Manager, E. C. Pond.

We regret to report the death, at his home in Charlestown, Mass., of Mr. Henry Brower, who passed away the morning of the 11th inst. He was born in Charlestown, May 10th, 1842, and received his tuition in its public schools. In 1863 he entered the service of the Charlestown Gas Company, finally working himself up to the position of cashier, and death found him still in its service. He is survived by his widow and one son. The funeral services were held the afternoon of the 13th inst, under the charge of the Rev. J. M. Blue, of the First Parish Church, and interment was made in Mount Auburn Cemetery.

"A COAL barge, known as the Henry Endicott, having a carrying capacity of 1,600 tons, was recently launched at Bath, Me. The barge is intended to carry coal from the Cape Breton mines to the Cambridge Gas Light Company, of Cambridge, Mass." So writes a correspondent; and it seems as a description to be all right up to the said point. But the concluding sentence reads like this: "*She* was christened by Mr. Daniel G. Tyler, a Director in the Cambridge Gas Light Company." However, we suppose mariners' license must be granted even as poets are given similar leeway, wherefore, the Henry Endicott goes as "She." Pity, the name wasn't Henrietta Endicott.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
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MONDAY, MAY 25, 1908.

The Market for Gas Securities.

The expected is happening and the actual investor is again coming into his own. Consolidated opened to-day (Friday) at 126 or so, and at the time of writing (1:30 P.M.) the bid is 127¼. The revision of the findings of Master Masten, and their virtual confirmation by the United States Court for this district, are now in the hands of the Supreme Court, before which body the matter has been given a preferred listing, the arrangement being a hearing during the October sitting, which surely means a decision before the first of the new year. To a layman the case now seemingly stands *res adjudicata*. All praise to the Consolidated executives for their prudence and tenacity.

The general gas share market is steady and strong. The advances in Peoples, of Chicago, and the Massachusetts Gas Companies shares is sufficient indication that by the New Year values in all gas stocks will have been restored to the normal.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MAY 25.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	127⅜	128¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	92	97
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual	3,500,000	100	130	160
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	92	96
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98	104
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	90	96
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	104	120
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91¼	92
Yonkers	250,000	500	120	—
Out-of-Town Companies.				
Bay State	50,000,000	50	1	11-16
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	2,250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed				
Gold Bonds	7,600,000	1,000	104	106¼
Cincinnati Gas and Electric				
Co.	20,500,000	100	89	89½
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. &				
Heating Co.	1,682,750	100	87	88
Preferred	3,026,500	100	81	89
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	—	—	74½	75
Detroit City Gas Co.	6,000,000	50	—	50
" Prior Lien 5's	4,618,000	1,000	—	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co.,				
Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Lt. Co.,				
1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of				
New Jersey	10,500,000	—	100	105
" Bonds, 5's	10,500,000	—	101	102½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	10	92	—
" 1st Mtg. 5's	250,000	1,000	97	100
Kansas City Gas Light Co.,				
of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	—	100
Preferred	2,500,000	100	60	70
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,370,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip,				
due 1910	100,000	25	60	60½
Massachusetts Gas Compan-				
ies, of Boston	25,000,000	100	56	56¼
Preferred	25,000,000	100	85	85¼
Montreal, Canada	2,000,000	100	218	219½
Nashville Gas Lt. Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co.,				
Chicago	24,000,000	100	95½	96¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Elec. Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco, Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	92	—
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¾	—
Syracuse, N. Y.	1,378,000	100	50	55
Bonds	2,047,000	1,000	102	—
Washington, D. C.	2,600,000	20	346½	353
1st Mortgage, 6's	600,000	—	—	—
Western, Milwaukee	4,000,000	—	—	—
Wilmington, Del.	600,000	50	230	—

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DIVIDEND NOTICE.

OFFICE OF THE AMERICAN GAS COMPANY,
222 S. THIRD ST., Philadelphia, Pa., May 19, 1908.

The Board of Directors of The American Gas Company has this day declared a semi-annual dividend of 3 per cent., or $3 per share, on the capital stock of the Company, payable June 1, 1908, to stockholders of record on May 25, 1908, at 3 P.M. Transfer books close May 25, 1908, and re-open June 1, 1908. Checks will be mailed.

1720-1 WALTER GODLEY, Treasurer.

WANTED,

Position as Manager or Superintendent of Gas and Electric Company,

In city of 20,000 to 50,000 inhabitants, by man competent to take entire charge. Strictly sober, energetic, thoroughly drilled in each department of operation and busines, 35 years old, married, excellent references. At present superintendent of works of large Western gas company.

1720-4 Address, "W. R. S.," care this Journal.

WANTED,

Posit'on as Manager, Superintendent or Engineer.

A young married man, who has had nine (9) years' practical experience in office sy tems, distribution, operation and construction of both coal and water gas properties. Prefers in city of 20,000 to 50,000 population, either North or South. Party is a draughtsman and can handle transit and leveling instruments.

1718-3 Address, "XOR," care this Journal.

Position Wanted

As Superintendent of Coal Gas Works,

By a steady, married man, with 15 years' experience. Address, "COAL GAS,"

171'-2 Care this Journal.

WANTED,

RETORT HOUSE FOREMAN.

A sober and industrious man, not afraid of work, as foreman of combined coal and water gas plant in town of 20,000. Must be able to operate the plant economically and show results. State salary expected.

17.0-1 Address "W. G.," care this Journal.

FOR SALE,

150-horse power boilers; No. 4 exhauster; condensers; water and coal gas tar extractor; 21,000-gallon steel oil tank; purifiers, 16 feet by 20 feet by 4 feet; ammonia concentrating plant; 8-inch Connelly automatic governor,

And other apparatus in good order and out of use within 30 days, due to the manufacture of water gas only in new location. Write for details.

1720-2 MOHAWK GAS CO., Schenectady, N. Y.

FOR SALE.

Two New No. 9½ Green Horizontal Gas Exhausters or Blowers. Capacity per revolution, 55 cubic feet; 20-inch connections.

Two Second-hand No. 9B Green Horizontal Gas Exhausters or Blowers. Capacity per revolution, 45 cubic feet; 16-inch connections.

For particulars, address, SEMET-SOLVAY COMPANY,
1711-3m Syracuse, N. Y.

FOR SALE.

One 7-foot American Meter Co. Station Meter, with 12-inch connections. The meter was built in 1896, and is in first-class condition.

Three Cast Iron Purifying Boxes, 21 feet by 21 feet by 4 feet deep; seal, 30 inches deep.

One Traveling Crane (track on floor), with oil pump and fittings complete, and 12-inch pipe, valves and fittings for a 3-box system complete.

Address, GEO. LIGHT,
1715-tf DAYTON, O.

FOR SALE.

FOUR SECOND-HAND PURIFIERS.

Dimensions, 10 feet by 14 feet by 3 feet deep, with dry center valve and connecting pipes 10 inches diameter. Seal 16 inches deep. Price, $600.

DAYTON GAS LIGHT AND COKE CO.,
1697-tf DAYTON, O.

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 100 in use. Write to

STROH & OSIUS, Patentees, or
MICHIGAN AMMONIA WORKS, - Detroit, Mich.

Gas Engineer's Pocket-book, — BY — HENRY O'CONNOR

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50. For Sale by

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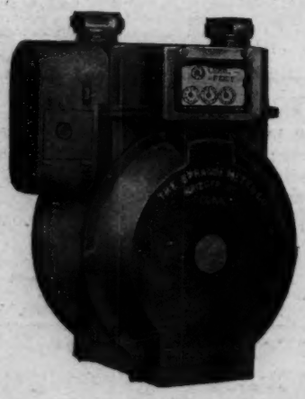

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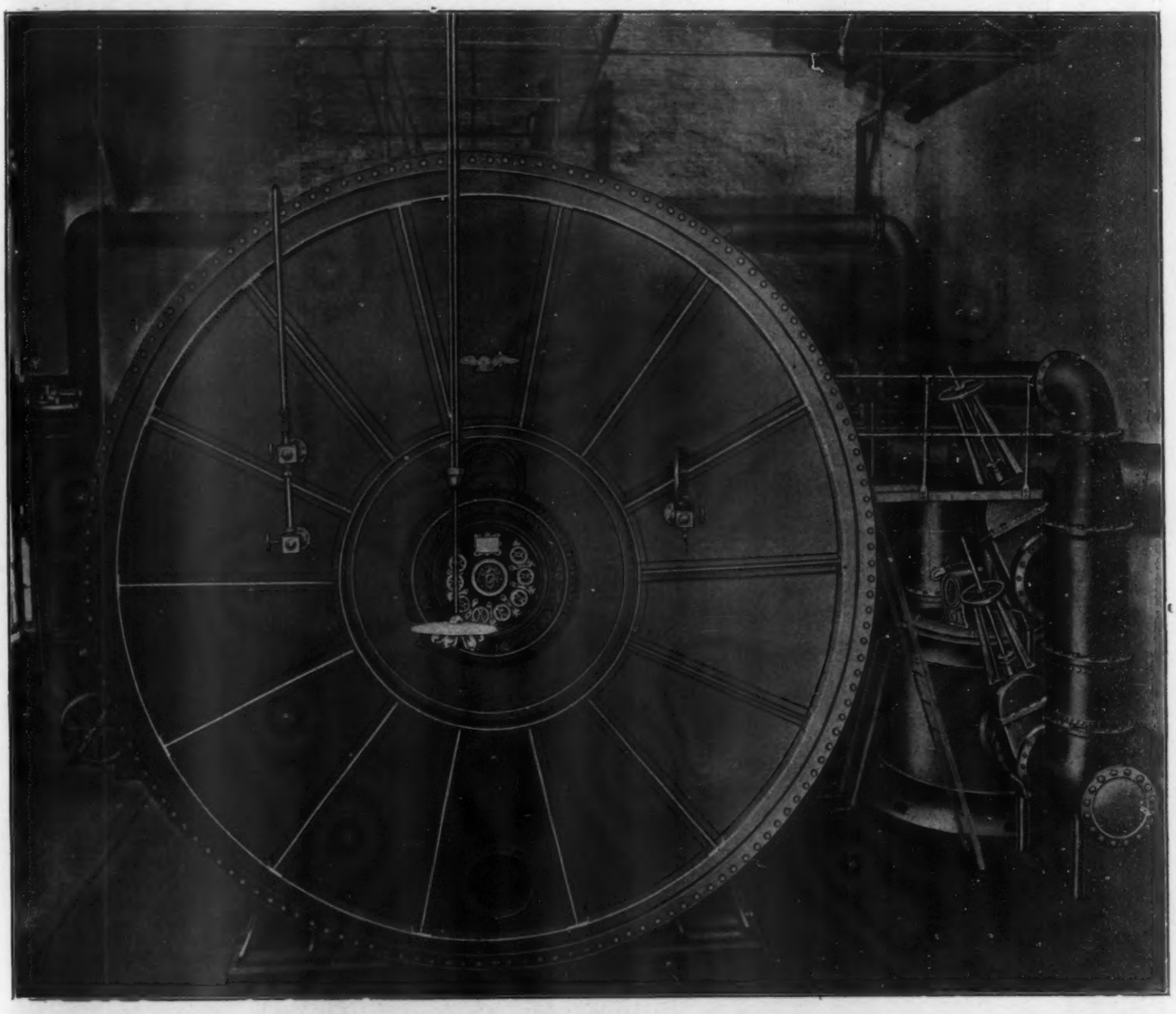

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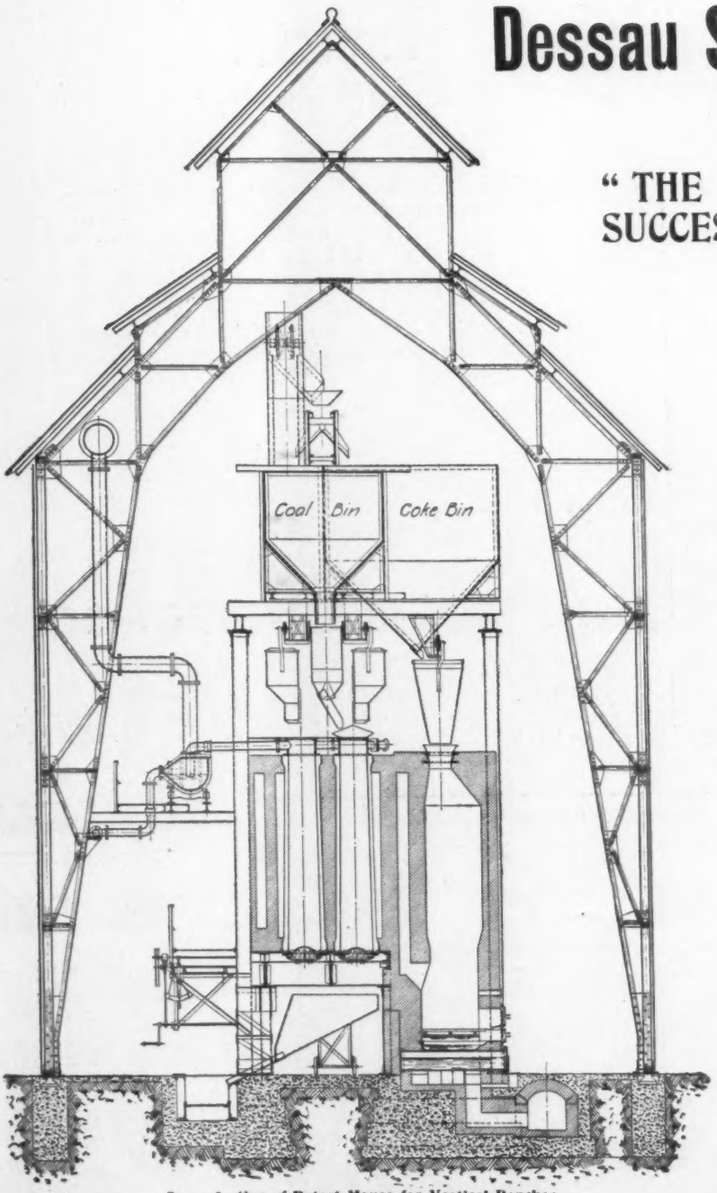

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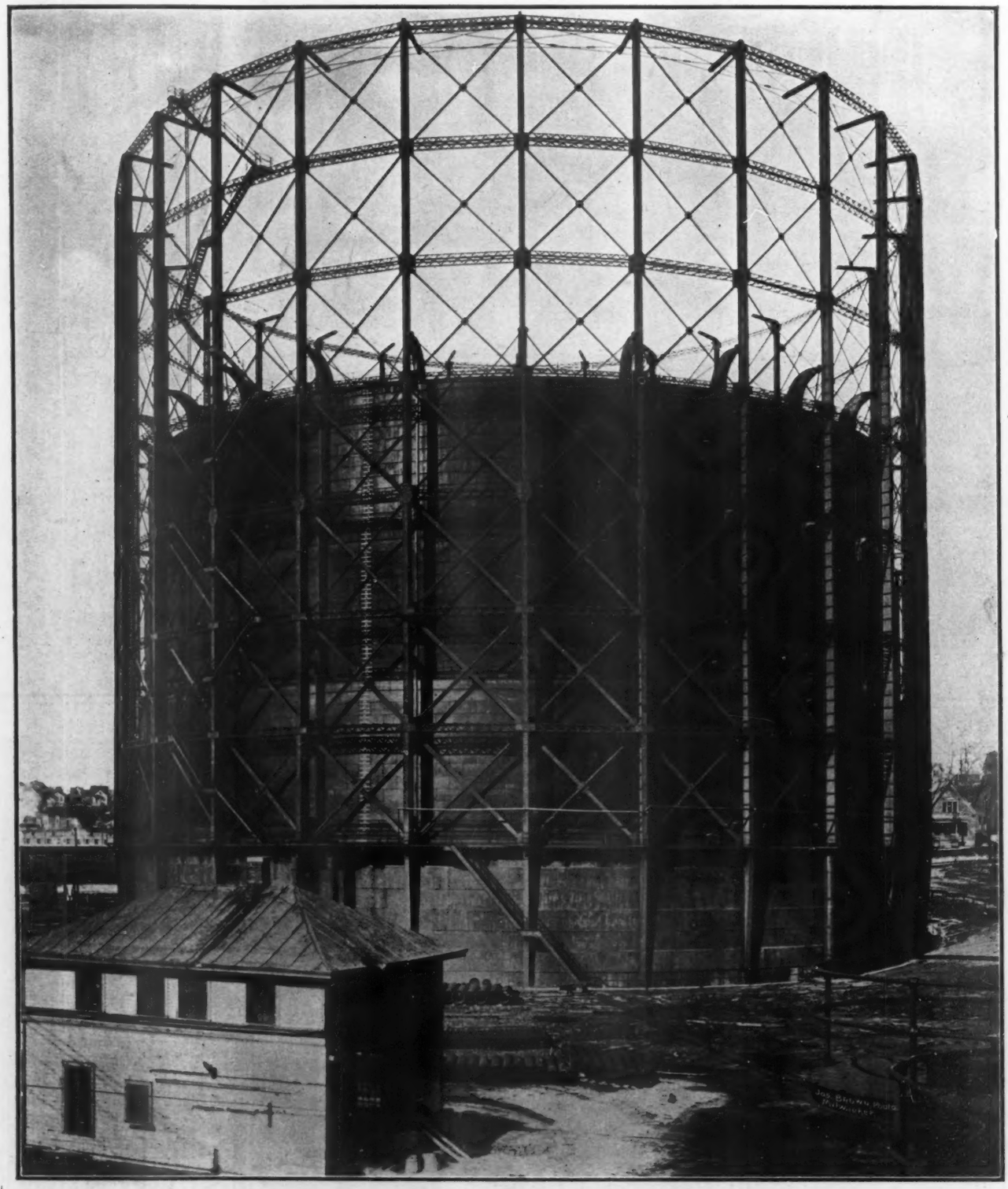

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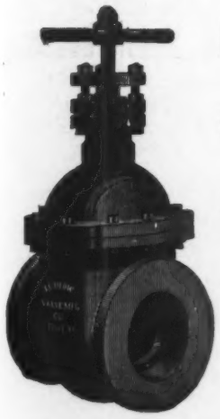

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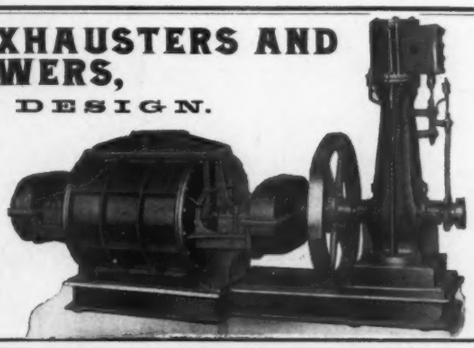

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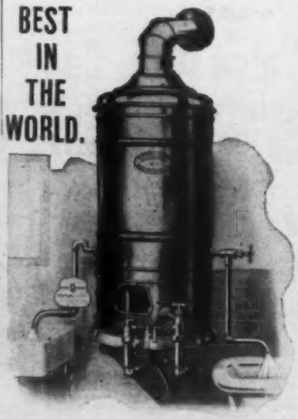

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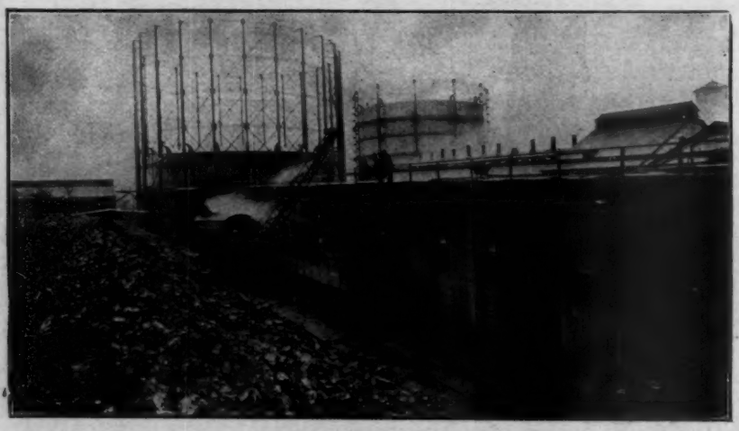

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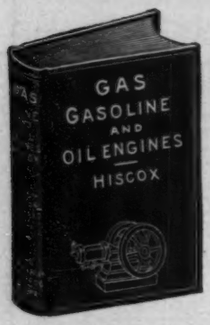

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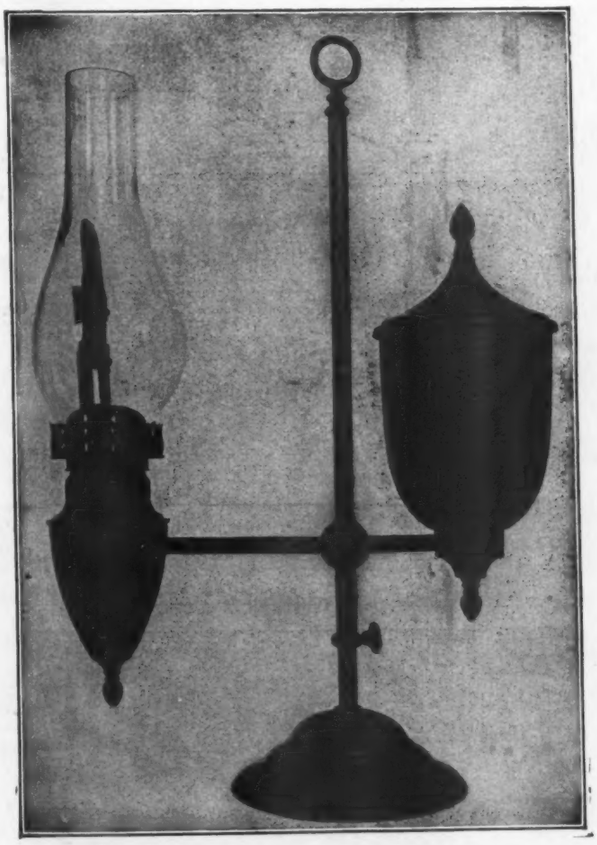
JUNE, 1908.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish.
Mon.	1	7.50 PM	3.30 AM
Tue.	2	7.50	3.30
Wed.	3	10.20	3.30
Thu.	4	10.50	3.30
Fri.	5	11.20	3.30
Sat.	6	11.50FQ	3.30
Sun.	7	12 20AM	3.30
Mon.	8	12.40	3.30
Tue.	9	1.10	3.30
Wed.	10	1.40	3.30
Thu.	11	2.10	3.30
Fri.	12	2.50	3.30
Sat.	13	No L.	No L.
Sun.	14	No L.FM	No L.
Mon.	15	No L.	No L.
Tue.	16	8.00 PM	10.50 PM
Wed.	17	8.00	11.40
Thu.	18	8.00	12.20AM
Fri.	19	8.00	1.00
Sat.	20	8.00LQ	1.30
Sun.	21	8.00	2.00
Mon.	22	8 00	2.20
Tue.	23	8.00	2.50
Wed.	24	8.00	3.20
Thu.	25	8.00	3.30
Fri.	26	8.00	3.30
Sat.	27	8.00	3.30
Sun.	28	8.00NM	3.30
Mon.	29	8.00	3.30
Tue.	30	8.00	3.30

TOTAL HOURS DURING 1908.

By Table No. 1.

	Hrs.Min.
January	228.30
February	187.30
March	192.00
April	160.10
May	155.10
June	138.00
July	155.50
August	173.40
September	185.20
October	214.00
November	218.10
December	226.40
Total, yr.	2235.00



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***

10-Candle Power.

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This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

JUNE, 1908.

Day of Week.	Date.	Table No. 2. New York City. All Night Lighting. Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A. M.
Mon.	1	7.12	3.17
Tue.	2	7.12	3.17
Wed.	3	7.12	3.17
Thu.	4	7.17	3.12
Fri.	5	7.17	3.12
Sat.	6	7.17	3.12
Sun.	7	7.17	3 12
Mon.	8	7.17	3.12
Tue.	9	7.17	3.12
Wed.	10	7.17	3.12
Thu.	11	7.17	3.07
Fri.	12	7.17	3.07
Sat.	13	7.17	3.07
Sun.	14	7.17	3.07
Mon.	15	7.17	3.07
Tue.	16	7.17	3.07
Wed.	17	7.17	3.07
Thu.	18	7.22	3.07
Fri.	19	7.22	3.07
Sat.	20	7.22	3.07
Sun.	21	7.22	3.07
Mon.	22	7.22	3.07
Tue.	23	7.22	3.07
Wed.	24	7.22	3.07
Thu.	25	7.27	3.07
Fri.	26	7.27	3.07
Sat.	27	7.27	3.07
Sun.	28	7.27	3.07
Mon.	29	7.27	3.07
Tue.	30	7.27	3.07

TOTAL HOURS DURING 1908.

	Hrs.Min.
January	481.50
February	329.15
March	351.50
April	341.50
May	233.05
June	218.10
July	282.55
August	254.55
September	292.25
October	420.45
November	374.30
December	411.05
	3992.35
Deduct on account of 50 min. extinguishing time	30.30
Total, yr.	3962.05

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

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...OF AMERICA....

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For decorative appearance and large volume of light at a popular price to the consumer,

THE CHIC LIGHT

is practically alone in the field. Complete satisfaction to the user is its strong point.

THE CHIC LIGHT—Design No. 71310.

PRICES:

Boxed complete, with No. 71 Welsbach burner, No. 310 F. Q. M. cylinder, No. 196 Junior J Brand Welsbach mantle, including the No. 316 opal shade, which will be packed separately.

Price, complete, clear cylinder, each, dozen lots, ... $1.35
Price, complete, clear cylinder, 100 lots, each, ... 1.25

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Package Contains 16 Dozen.

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Everett, Mass.
Jenkintown, Pa. (2d contract).
Coney Island, N. Y.
Mexico, Mo.
Jacksonville, Fla.
Syracuse, N. Y. (2d contract).
Atlanta, Ga. (2d contract).
Holyoke, Mass.
Peoria, Ills.
Schenectady, N. Y. (2d contract).
Danbury, Conn.
Galveston, Tex. (2d contract).
Quebec, Canada.
Indianapolis, Ind. (2d contract).
Bessemer, Ala.
Waterbury, Conn. (5th contract).
Sioux Falls, S. D. (3d contract).
Philadelphia, Pa.
New Hartford, Conn.
Poughkeepsie, N.Y. (2d contract)
Nashville, Tenn.
Salisbury, Md.
Norfolk, Va. (4th contract).
Wallingford, Conn.
Richmond, Va. (2d contract).
Oak Bluffs, Mass.
Arlington, Mass.

TOTAL SETS INSTALLED DURING YEAR, ... 43
TOTAL SETS INSTALLED TO DECEMBER 31, 1907, ... 677
TOTAL DAILY CAPACITY, TO DECEMBER 31, 1907, ... 545,865,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.
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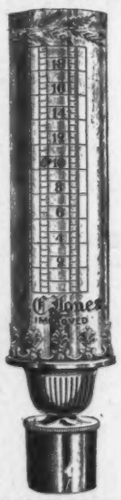

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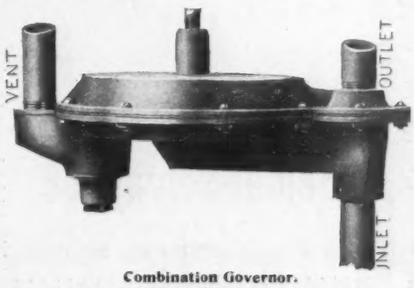

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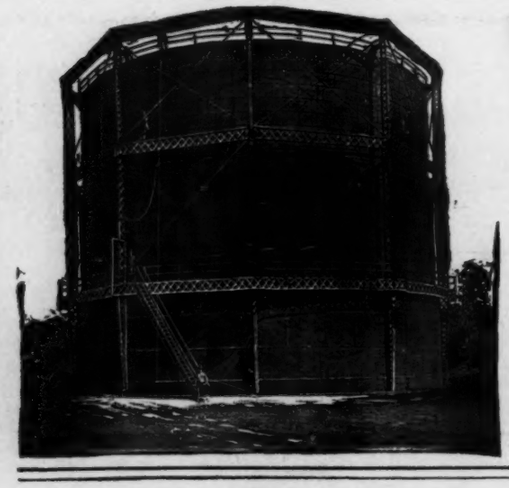

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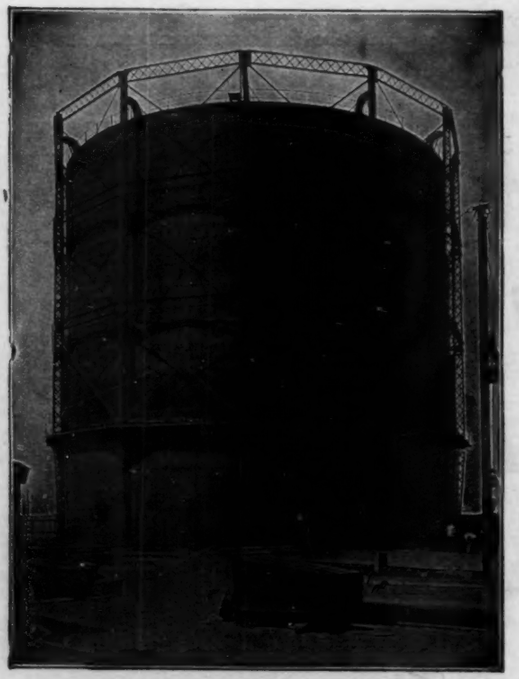

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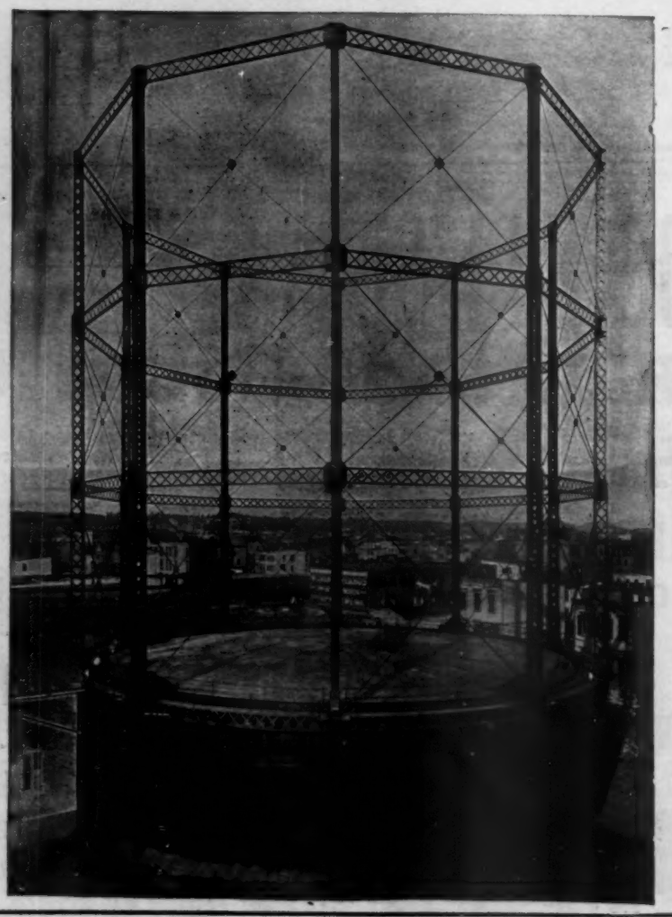

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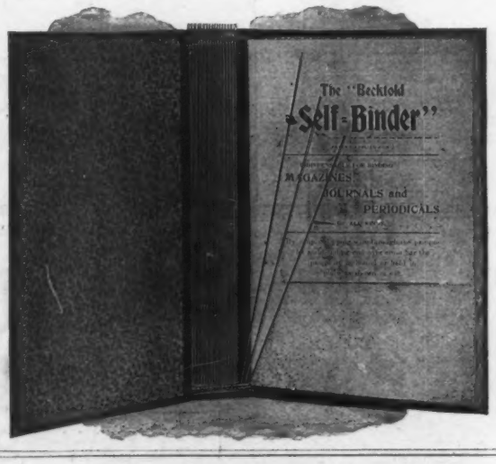

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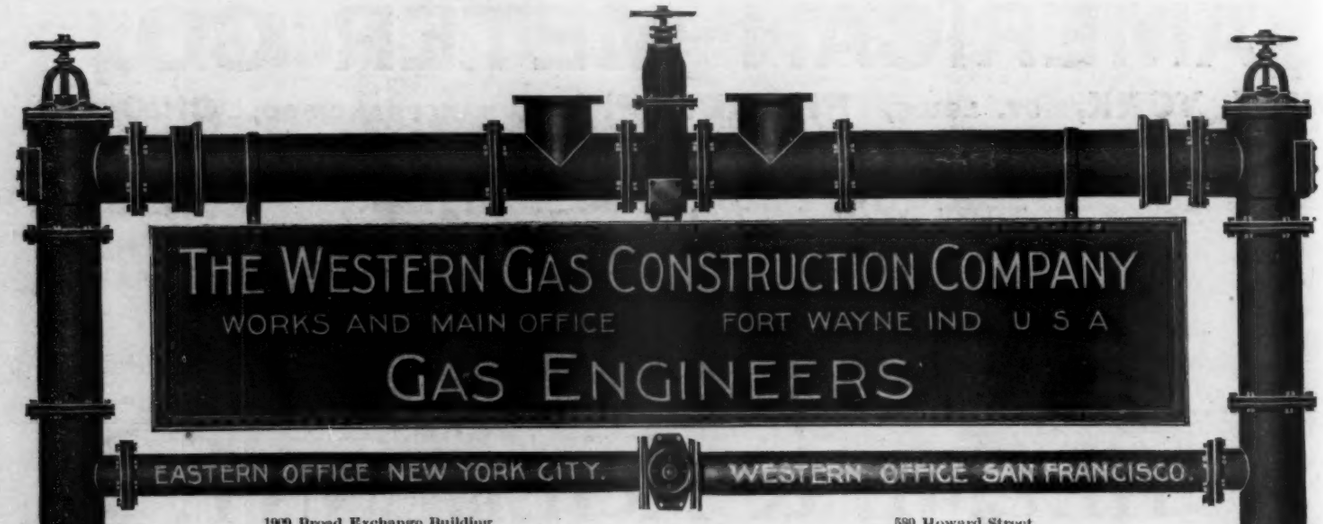
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